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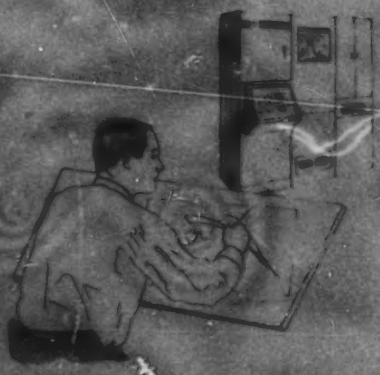
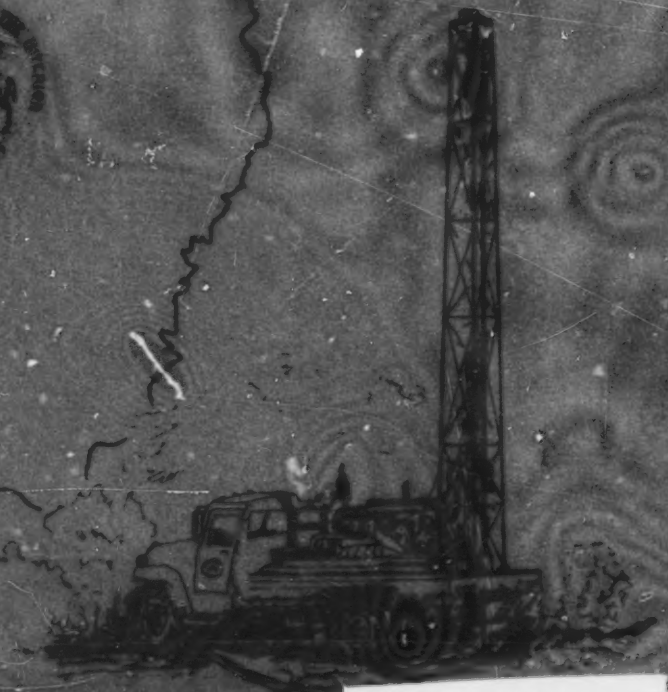
WATER RESOURCES ACTIVITIES IN ILLINOIS

1984

Illinois District
U.S. Geological Survey
Water Resources Division





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The U.S. Geological Survey, Water Resources Division, is now entering its 83rd year of activities in Illinois. Throughout these years our efforts have been directed towards providing the hydrologic data and information necessary for the State and the Nation to make knowledgeable decisions relating to water resources. In recent years, manpower and fiscal constraints have sometimes hampered our ability to provide all the information requested. However, our continuing goal will be to provide high quality information to meet continuing and emerging priority data needs.

During the fiscal year that just ended, several actions were taken to improve the quality of information and the efficiency of collecting and disseminating it. Modern technological instruments such as acoustical velocity and magnetic velocity meters are being used at selected stream-gaging installations. A PRIME minicomputer has been installed in the District office with terminal connections at Field offices. Our ability to process and store data locally will increase our efficiency and responsiveness in supplying data to the users.

During the year, 18 reports were published relating to time of travel and dispersion in streams, hydrology of coal-producing areas in Illinois, sediment transport, quality of ground water, cost effectiveness of stream-gaging, urban lakes, and hydrogeology of special study sites.

The needs for hydrologic information are continuing to increase. We are pleased that many local, State, and Federal agencies have provided us the opportunity to assist them in meeting their needs and the needs of Illinois and the Nation. We, at the USGS, look forward to a continuing role in these activities.

Larry W. Toler
District Chief

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WATER RESOURCES ACTIVITIES

IN ILLINOIS

1984

Compiled by Mary L. Garrelts

Urbana, Illinois

February 1985

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UNITED STATES DEPARTMENT OF THE INTERIOR

DONALD PAUL HODEL, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

For additional information write to:

District Chief
U.S. Geological Survey
102 E. Main St., 4th Floor
Urbana, IL 61801

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WATER RESOURCES ACTIVITIES IN ILLINOIS, 1984

By Mary L. Garrelts

ORIGIN AND MISSION OF THE U.S. GEOLOGICAL SURVEY

The U.S. Geological Survey was established by an act of Congress on March 3, 1879, to provide a permanent Federal agency to conduct the systematic and scientific "classification of the public lands, and examination of the geological structure, mineral resources, and products of national domain." An integral part of that original mission includes publishing and disseminating the earth-science information needed to understand, to plan the use of, and to manage the Nation's energy, land, mineral, and water resources.

Since 1879, the research and fact-finding role of the USGS has grown and been modified to meet the changing needs of the Nation it serves. As part of that evolution, the USGS has become the Federal Government's largest earth-science research agency, the Nation's largest civilian mapmaking agency, the primary source of data on the Nation's surface- and ground-water resources, and the employer of the largest number of professional earth scientists. Today's programs serve a diversity of needs and users. Programs include:

- Conducting detailed assessments of the energy and mineral potential of the Nation's land and offshore areas.
- Investigating and issuing warnings of earthquakes, volcanic eruptions, landslides, and other geologic and hydrologic hazards.
- Conducting research on the geologic structure of the Nation.
- Studying the geologic features, structure, processes, and history of the other planets of our solar system.
- Conducting topographic surveys of the Nation and preparing topographic and thematic maps and related cartographic products.
- Developing and producing digital cartographic data bases and products.
- Collecting data on a routine basis to determine the quantity, quality, and use of surface and ground water.
- Conducting water-resource appraisals in order to describe the consequences of alternative plans for developing land and water resources.
- Conducting research in hydraulics and hydrology, and coordinating all Federal water-data acquisition.

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- Using remotely sensed data to develop new cartographic, geologic, and hydrologic research techniques for natural resources planning and management.

- Providing earth-science information through an extensive publications program and a network of public access points.

Along with its continuing commitment to meet the growing and changing earth-science needs of the Nation, the USGS remains dedicated to its original mission to collect, analyze, interpret, publish, and disseminate information about the natural resources of the Nation--providing "Earth Science in the public Service."

MISSION AND PROGRAM OF THE WATER RESOURCES DIVISION

The mission of the Water Resources Division is to provide the hydrologic information and understanding needed for the optimum utilization and management of the Nation's water resources for the overall benefit of the people of the United States.

This is accomplished, in large part, through cooperation with other Federal and non-Federal agencies, by:

- Collecting, on a systematic basis, data needed for the continuing determination and evaluation of the quantity, quality, and use of the Nation's water resources.

- Conducting analytical and interpretive water-resource appraisals describing the occurrence, availability, and the physical, chemical, and biological characteristics of surface and ground water.

- Conducting supportive basic and problem-oriented research in hydraulics, hydrology, and related fields of science to improve the scientific basis for investigations and measurement techniques and to understand hydrologic systems sufficiently well to quantitatively predict their response to stress, either natural or manmade.

- Disseminating the water data and the results of these investigations and research through reports, maps, computerized information services, and other forms of public releases.

- Coordinating the activities of Federal agencies in the acquisition of water data for streams, lakes, reservoirs, estuaries, and ground waters.

- Providing scientific and technical assistance in hydrologic fields to other Federal, State, and local agencies, to licensees of the Federal Power Commission, and to international agencies on behalf of the Department of State.

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ILLINOIS DISTRICT

Organization

The Illinois District of the U.S. Geological Survey, Water Resources Division, consists of two operating sections, two support units, and three field offices (fig. 1). Personnel are based at the District office and one Field Headquarters in Urbana, a Field Headquarters in Mt. Vernon, and a Subdistrict office in De Kalb. The District operates with guidance from Regional and National offices in Reston, Virginia. Offices for research, training, equipment development, and laboratory services, located throughout the United States, provide technical assistance and advice to the District.

Network Operations Section

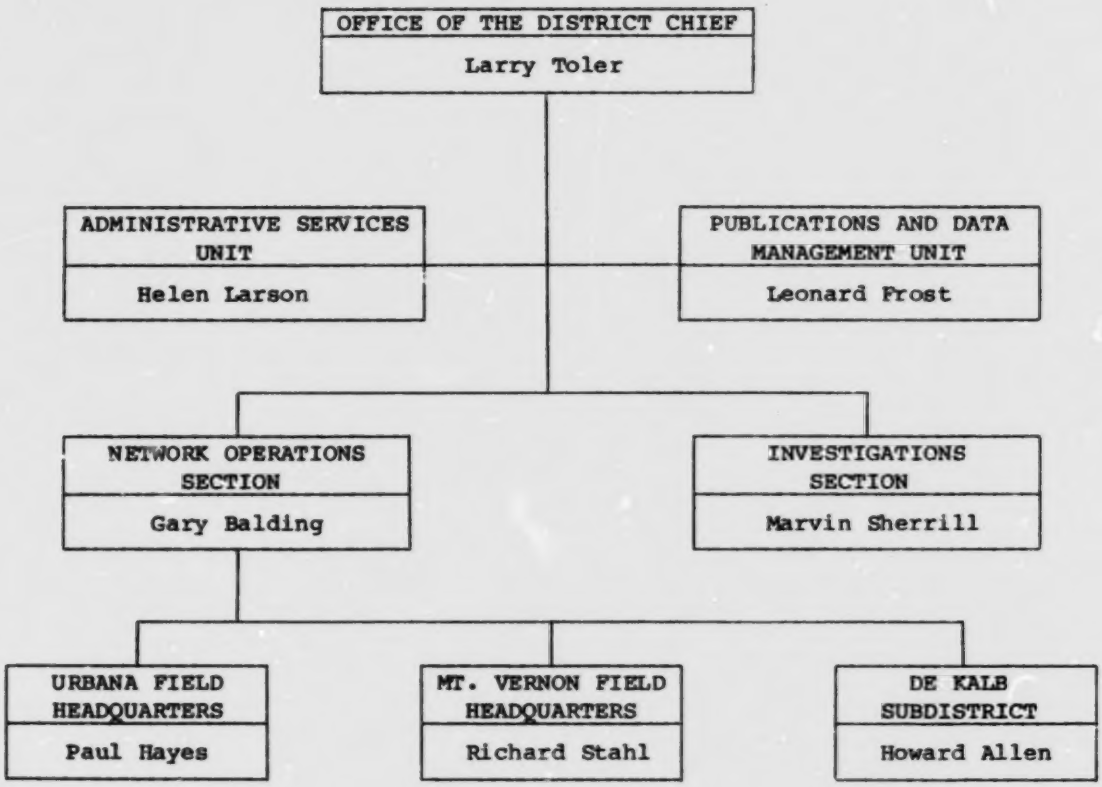
The Network Operations Section designs and implements a network of stream-gaging, water-quality, sediment, and observation-well sites based on data needs. The Section directs the installation and maintenance of equipment, data collection and analysis, and compilation of records for publication in the annual data report. It maintains the drainage area map file and all hydrologic-data files. The Section conducts special data-collection efforts as needed or on demand, for example, major floods, low-flow measurements, and indirect measurements, and provides assistance in the collection of water-resources data in support of projects. The Section conducts special projects related to water use and coordinates the water-use program. Field offices are responsible for data collection in their designated areas and report to the Chief, Network Operations Section (fig. 2).

Investigations Section

The Investigations Section conducts multi-discipline hydrologic investigations to determine the quantity and quality of surface and ground water and to define and evaluate the extent and availability of water resources of drainage basins, counties, States, and water-resources regions. The Section conducts special hydrologic and research studies on current water issues such as coal hydrology, radiohydrology, mineral and energy development, sediment and erosion, urban hydrology, water disposal, and river quality. Special investigative techniques for water-resource evaluation include test drilling, packer tests, tracers, surface and borehole geophysics, and ground-water and surface-water modeling of flow and solute movement. Personnel prepare and review reports of investigations for both scientific and lay audiences.

Publications and Data Management Unit

This support unit provides ADP services; maintains computer manuals and program catalogs, does computer programing, and assists hydrologists in program selection, application, and modification. The Unit assembles reports



District Office	(217) 398-5353	U.S. Geological Survey 102 E. Main Street, 4th Floor Urbana, Illinois 61801
Urbana Field Headquarters	(217) 398-5570	102 E. Main Street, 4th Floor Urbana, Illinois 61801
Mt. Vernon Field Headquarters	(618) 242-4495	Room 231, Federal Building 105 S. Sixth Street Mt. Vernon, Illinois 62864
De Kalb Subdistrict	(815) 753-1162	629 Lincoln Terrace P.O. Box 427 De Kalb, Illinois 60115

Figure 1.--Illinois District organization chart with office addresses.

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Figure 2.--Suboffice areas of responsibility.

for colleague, regional, and division review, prepares camera-ready copy for publication, keeps manuscript status records, and prepares printing specifications. The Unit maintains the District's data files and library; maintains District warehouse facilities, including supplies of hand tools and shop equipment; processes vehicle procurement and disposition; and maintains the District controlled-property inventory.

Administrative Services Unit

The Administrative Services Unit is responsible for maintenance of and compliance with Federal acquisition regulations, Departmental manuals, and Bureau and Division operating policies. The Unit provides support services in the areas of administrative management, budget formulation and execution, financial planning, accounting, personnel, procurement, space management, and general office procedures.

Budget and Funding Sources

Funds to support the work performed by the Illinois District, Water Resources Division, are derived from three principal sources.

Federal Program

Funds for the Federal Program are appropriated by the Congress, and are specifically identified in the annual Geological Survey budget. These funds are used to support research, data collection, high-priority topical programs including energy-related programs, the coordination of all Federal programs related to collection of water data, and internal support services.

Federal-State Cooperative Program

Federal funds are appropriated by the Congress and used to match those furnished by State and other tax-supported agencies on a 50-50 basis. These funds are used for a variety of hydrologic data-collection activities and water-resources investigations in which the Water Resources Division represents the national responsibilities and the cooperating agencies represent State and local interests. Agencies supporting water-resources activities in Illinois during fiscal year 1984 are listed in table 1.

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Table 1.--Agencies supporting water-resources activities during fiscal year 1984

State Agencies

Illinois Department of Transportation
- Division of Water Resources

Illinois Environmental Protection Agency
- Division of Water Pollution Control
- Division of Public Water Supplies

Illinois Department of Energy and Natural Resources
- Water Survey Division

Illinois Department of Nuclear Safety

Local Agencies

Bloomington and Normal Sanitary District

Forest Preserve District of Cook County

The Metropolitan Sanitary District of Greater Chicago

City of Springfield

City of Decatur

Federal Agencies

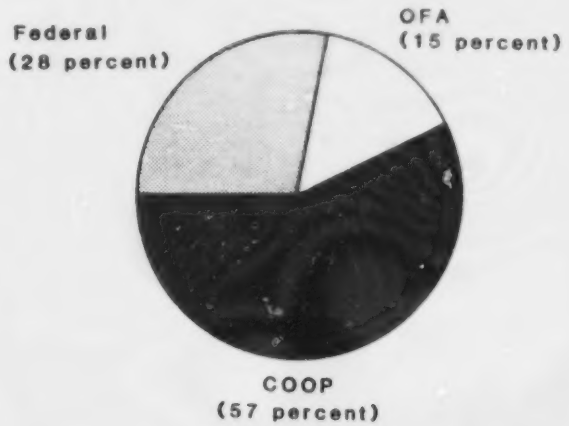
Department of the Army
- Corps of Engineers
  - Rock Island District
  - St. Louis District
  - Louisville District
  - Chicago District

Department of Housing and Urban Development
- Federal Emergency Management Agency

Other Federal Agencies (OFA) Program

In this program, the funds are transferred to the Geological Survey as reimbursement for work performed at the request of another Federal agency.

Activities supported by the above sources in fiscal year 1984 amounted to about $2,900,000 which was distributed as follows:



The diagram below shows the percentage of the activities for fiscal year 1984 in each of the broad categories of hydrologic data collection and water-resource investigations:

The activities are directed toward obtaining the information needed by managers and planners for the solution or alleviation of water problems in Illinois and the Nation.

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WATER ISSUES AND CONDITIONS

Illinois generally has adequate supplies of water suitable for most uses. The mean annual precipitation for the 1951-80 period is shown in figure 3. Water is available from several major rivers and lakes within or bordering Illinois and from ground-water sources. In the northern one-third of the State, most municipal water supplies are obtained from ground water, whereas, in the remainder of the State, municipal supplies generally are obtained from surface-water sources. In the southern two-thirds of the State, potable ground water may be obtained locally from alluvium-filled shallow valleys that were eroded into the bedrock by ancestral streams.

The Water Resources Division is the principal Federal agency responsible for providing hydrologic information required for the best utilization and management of the Nation's water resources. Three of the major water-resources issues currently being addressed by the Illinois District of the Water Resources Division have to do with water-availability, water-quality, and hydrologic hazards and land-use issues. These issues are summarized below.

Water-Availability Issues

Ground water is the source for most municipal supplies in the northern part of the State, especially in the Chicago metropolitan area. Water withdrawals in this area have created water-level declines in excess of 850 feet. Most rural supplies throughout the State are obtained from shallow aquifers that are vulnerable to drought and contamination. During drought, some surface-water supplies are inadequate, particularly in the southern two-thirds of Illinois. Withdrawals of water (ground water plus surface water) are shown in figure 4.

Water-Quality Issues

Pollution of streams by hazardous-waste from disposal sites and by overflows from combined storm and sanitary sewers is recognized as an important issue. Nonpoint source pollution resulting from runoff from agricultural lands and modification of stream channels is a statewide issue. Statewide, streams and lakes may be affected by sedimentation, turbidity, aquatic weeds, fluctuating water levels, algal blooms, and oxygen depletion.

Ground-water pollution in Illinois has numerous sources including landfills, feed lots, septic systems, road salts, spills, abandoned wells, mine wastes, and saline intrusion. More than 500 potential hazardous-waste sites have been identified in the State. Maximum allowable concentrations of volatile organics, fluoride, and barium sulfate in ground water in some areas are exceeded.

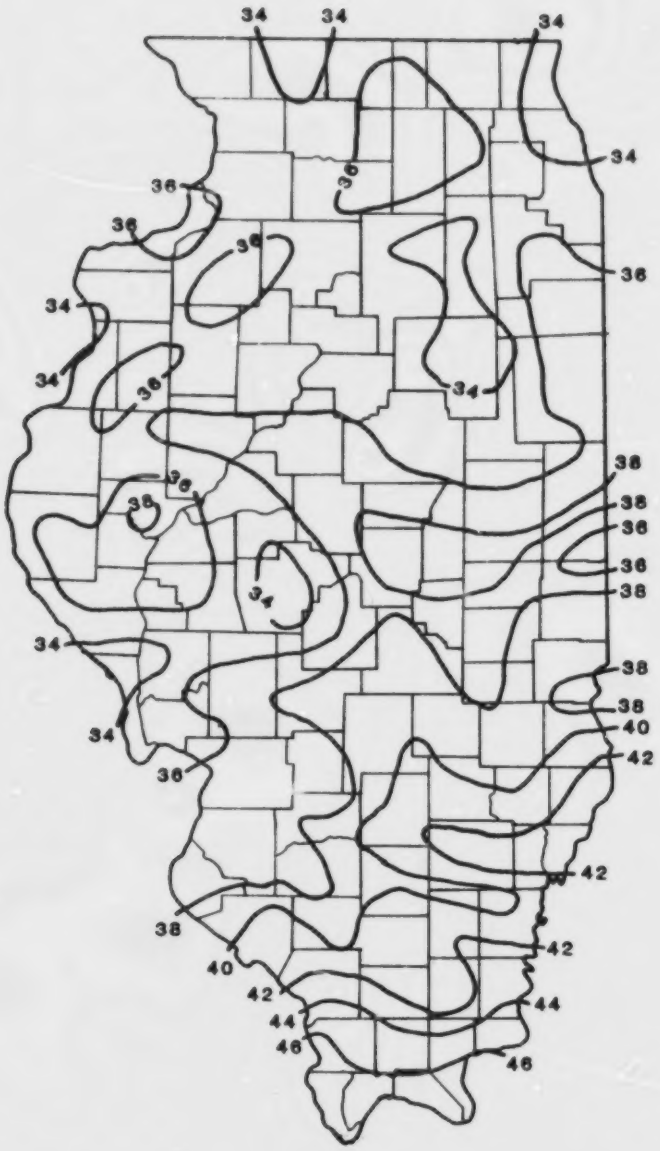

Figure 3.--Mean annual precipitation, 1951-80.

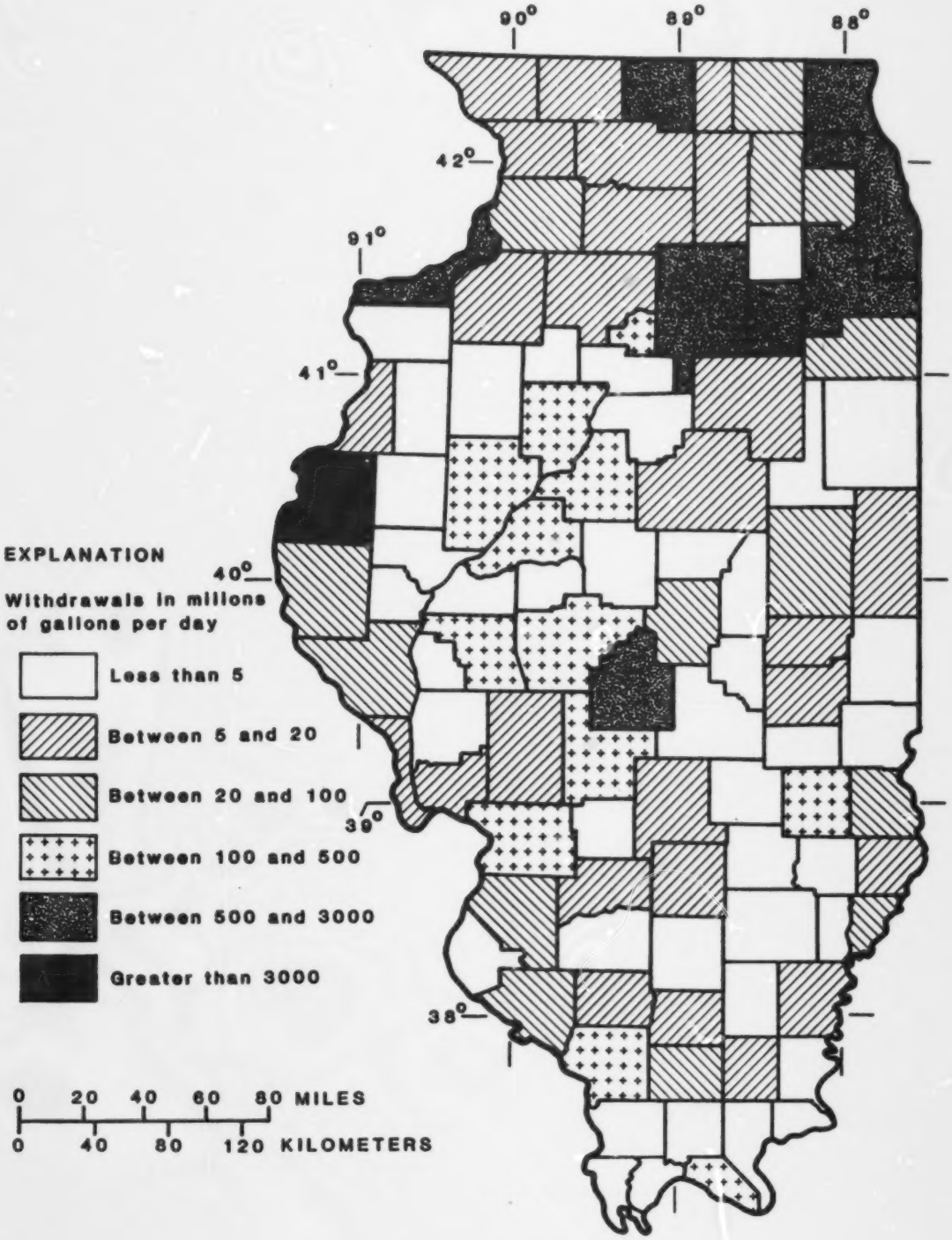

Figure 4.--Water withdrawals, estimated and reported for 1982 (Kirk, Sanderson, and Sasman, 1984, table 16).

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Hydrologic Hazards and Land-Use Issues

Flood damages in urban areas have increased more than 900 percent since the mid-1960's. Rising ground-water levels in parts of the East St. Louis area have caused flooded basements and structural damage to buildings. Some degree of erosion occurs statewide, and affects croplands, streams, lakes, and reservoirs. In some areas more than one-third of the original soil has been estimated to have been eroded during the past 100 years. Many wetland areas in the State have been drained to allow for agricultural, urban, and industrial uses during the past 160 years. Of the less than 50,000 acres of wetlands remaining, less than 25 percent are protected by either the State or Federal government.

WATER QUANTITY AND QUALITY

Surface-Water Quantity

Surface-water discharge (streamflow) and stage (water level) data are collected for general hydrologic purposes such as assessments of water resources, areal analyses, determination of long-term trends, research and special studies, or for management and operational purposes. In Illinois, data on discharge and stage were obtained at the following numbers of stations:

Station classification	Number of stations
Stream stations	169
Continuous record:	
Discharge and stage	139
Stage only	5
Partial record:	
Peak (maximum) flow only	25
Lake and reservoir stations	8
Stage and contents	3
Stage only	5
Total	177

The locations of sites where streamflow or stage are collected are shown in figure 5, and the types of data collected are shown in table 2. Average runoff for the 1951-80 period is shown in figure 6.

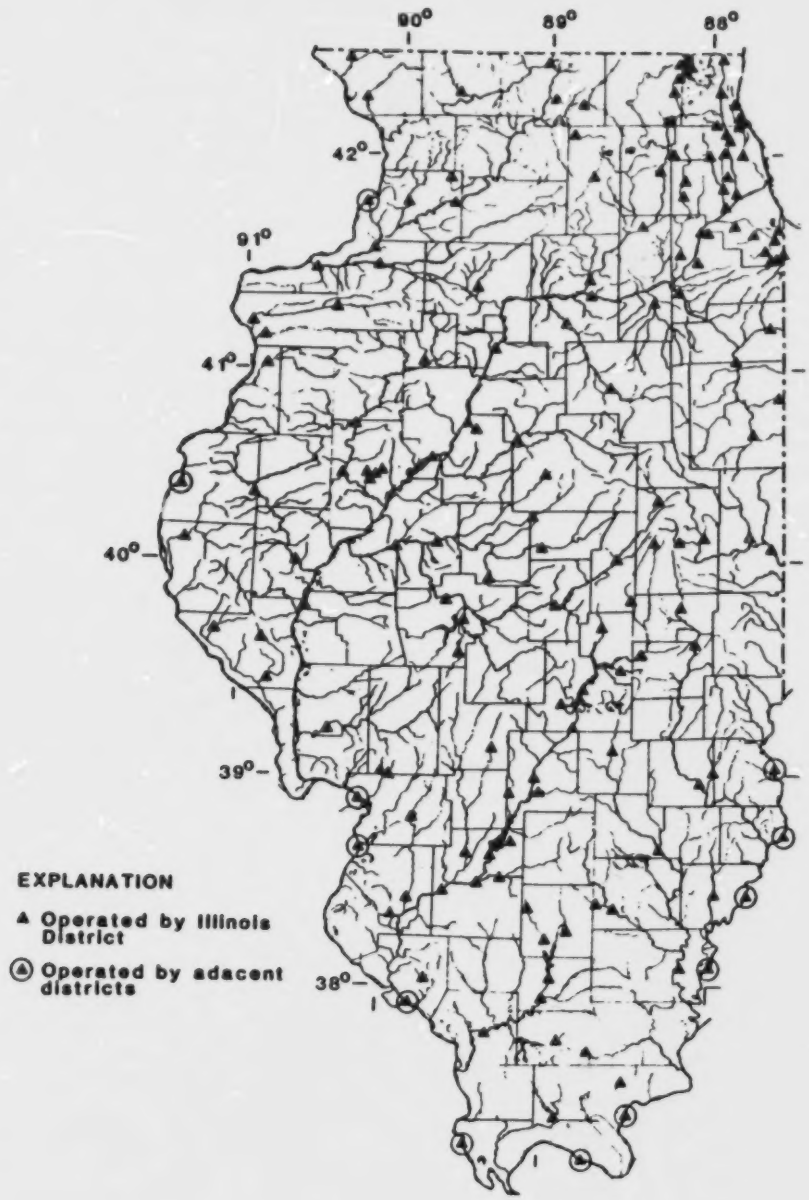

Figure 5.--Surface-water stations.

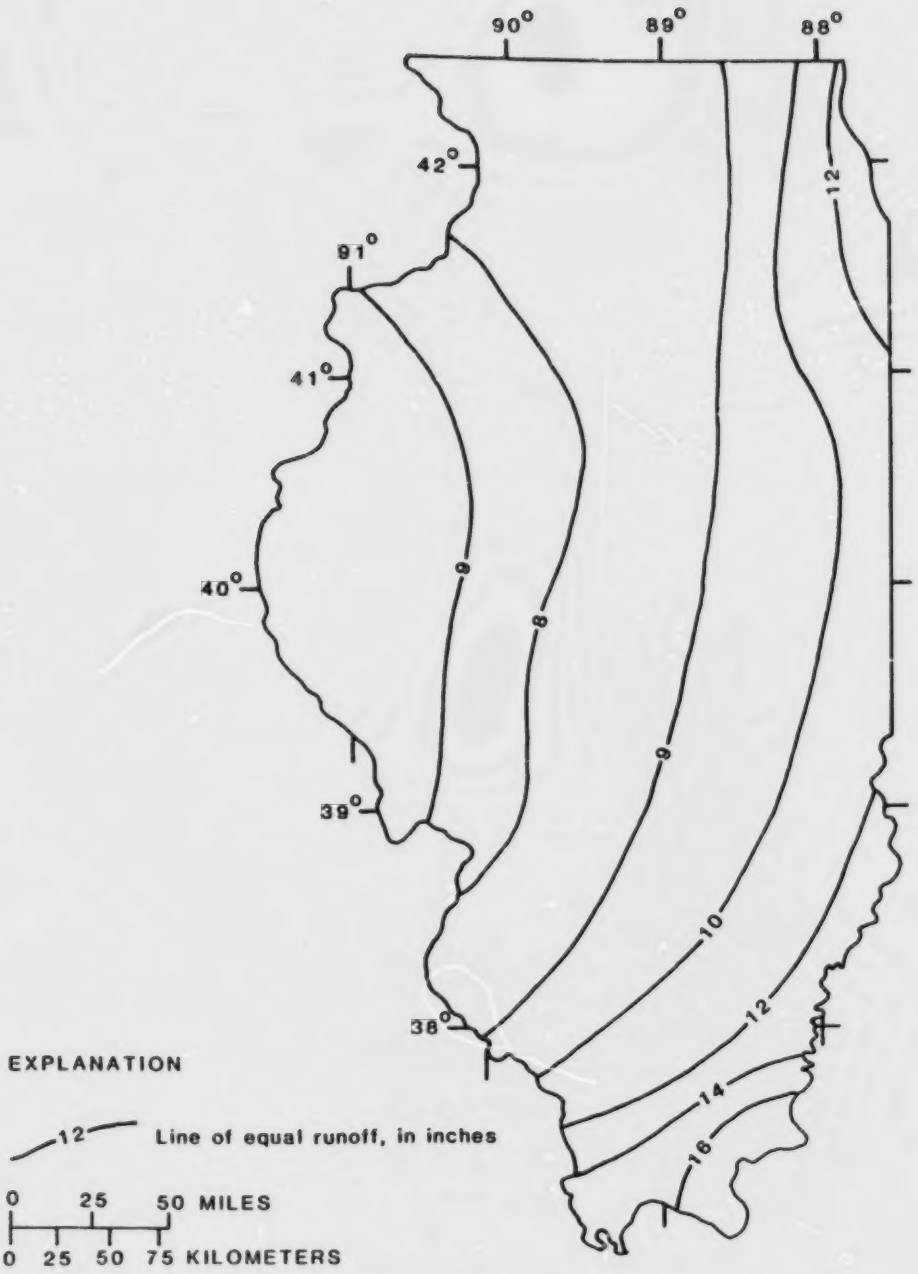

Figure 6.--Average annual runoff, in inches, 1951-80.

Surface-Water Quality

Data collected from 204 water-quality sampling stations, operated jointly by the U.S. Geological Survey and the Illinois Environmental Protection Agency (IEPA), were recently evaluated by the IEPA (1984). The evaluation showed that between 1972 and 1982 major water-quality improvements took place. Fewer river miles of streams were considered seriously degraded in 1982 than in 1972 (fig. 7). Approximately 35 percent of the streams assessed showed improvement, 64 percent were unchanged, and only 1 percent were degraded. Causes of stream-use impairment are shown in figure 8. Water-quality stations operated during fiscal year 1984 are shown in figure 9 and are listed in table 2.

Two parameters of serious concern at the present are dissolved oxygen and ammonia. Despite the recognition of ammonia as a current problem, violations of State standards (Illinois Pollution Control Board, 1984) for both total and un-ionized ammonia have shown downward trends since 1978. Violation rates for iron and fecal coliform bacteria were higher in 1982 and 1983 than they were in the previous 4 years.

Chlordane, dieldrin, and pentachlorophenol have been detected in samples from a network of 38 stream and 3 Lake Michigan sites sampled by the IEPA. Pentachlorophenol detection rates (percentage of samples in which is detected) have varied in the past several years, however, there seems to be a recent upward trend. The rate of detection of pesticides in stream-bottom materials seems to be trending downward although no uniform sampling program exists for these parameters.

General levels of mineralization of surface waters in Illinois are shown in figure 10. Sulfate concentrations, which reflect areas with surface coal mining, are also shown in figure 10.

Data classification	Number of stations
Physical data:	
Water temperature	201
Specific conductance	201
pH	201
Dissolved oxygen	201
Sediment data	11
Chemical data:	
Inorganic constituents	199
Organic constituents	201
Microbiological data	199

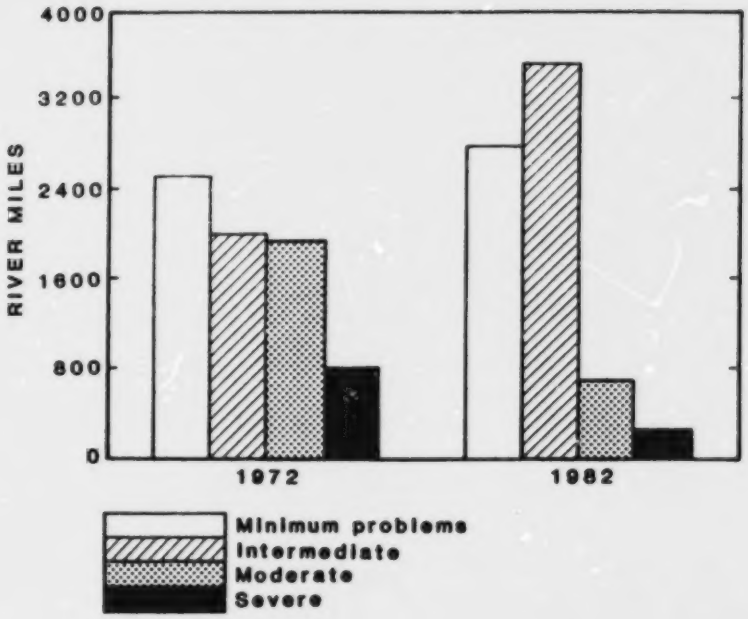

Figure 7.--Changes in stream conditions in Illinois (IEPA, 1984).

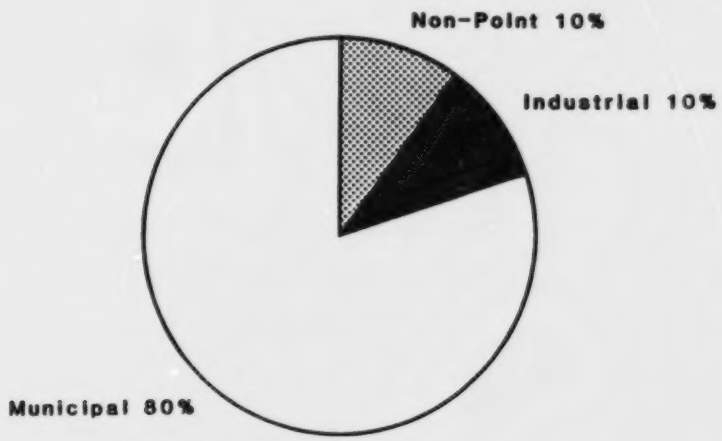

Figure 8.--Causes of use impairment of Illinois streams (IEPA, 1984).

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Figure 9.--Water-quality stations.

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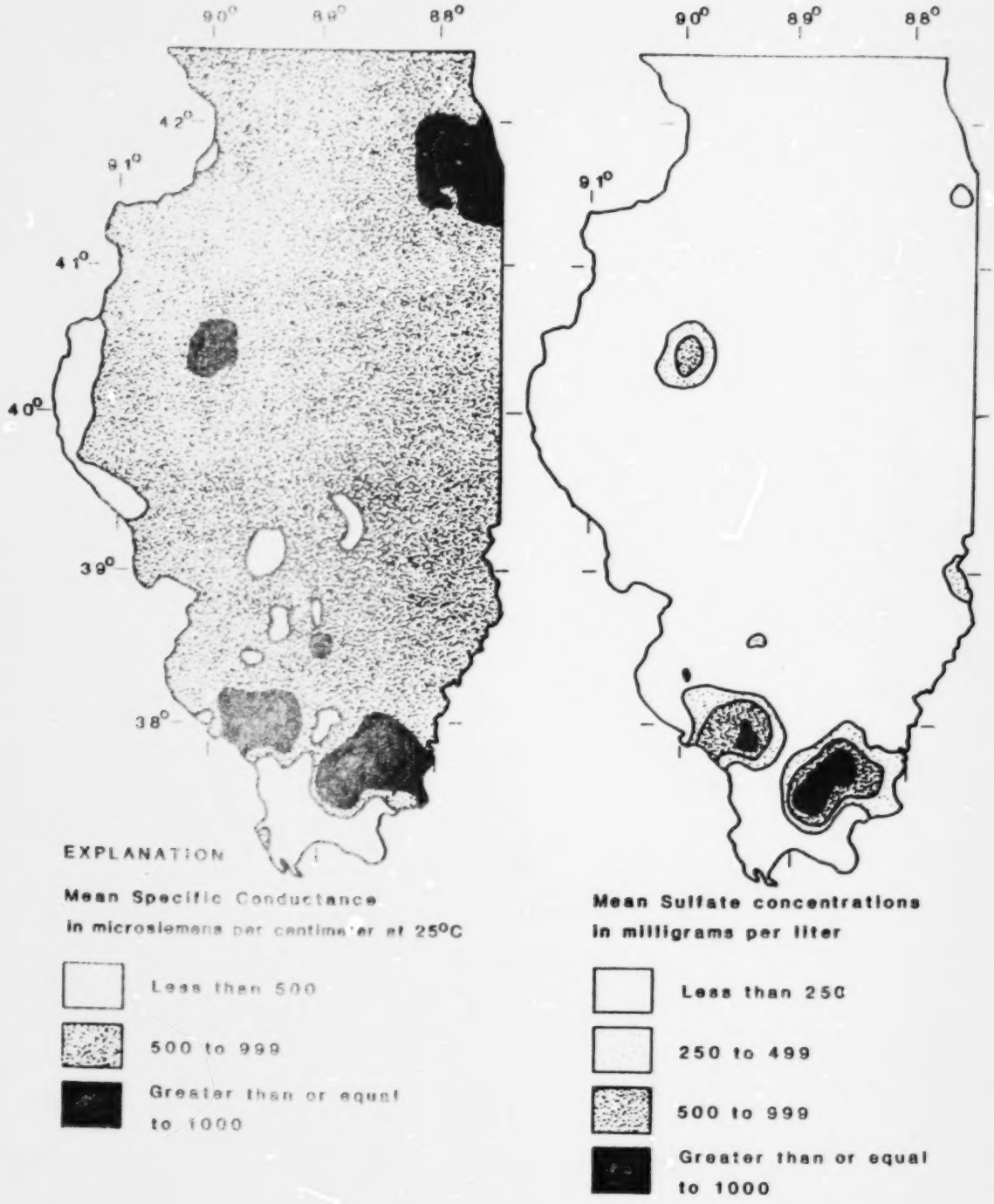

Figure 10.--Mean specific conductances and mean sulfate concentrations for streams in the Illinois surface-water-quality network.

Ground Water

Water levels in wells, discharges of springs and wells, and water-quality data are key characteristics in monitoring ground-water trends; however, these hydrologic characteristics must be integrated with other observations and ground-water system studies in order to have the fullest meaning and usefulness. In Illinois, the U.S. Geological Survey regularly measures water levels in three wells referred to as observation wells. Other wells, 212 in number, are known as project wells and are used for specific studies. Among these are 105 public water supply wells which comprise the newly established ground-water-quality observation network.

The types of data collected for observation and project wells are as follows:

Data type	Number of wells
Water levels	215
Physical data:	
Water temperature	111
Specific conductance	111
pH	111
Chemical data:	
Inorganic constituents	115
Organic constituents	6

The ground-water stations and types of data collected are listed in table 3. No water quality data are obtained at the three observation wells. Locations of wells in the water-level observation network and the water-quality observation network are shown in figure 11.

DATA MANAGEMENT

The Water Resources Division manages data from its own activities and from the activities of other water oriented agencies.

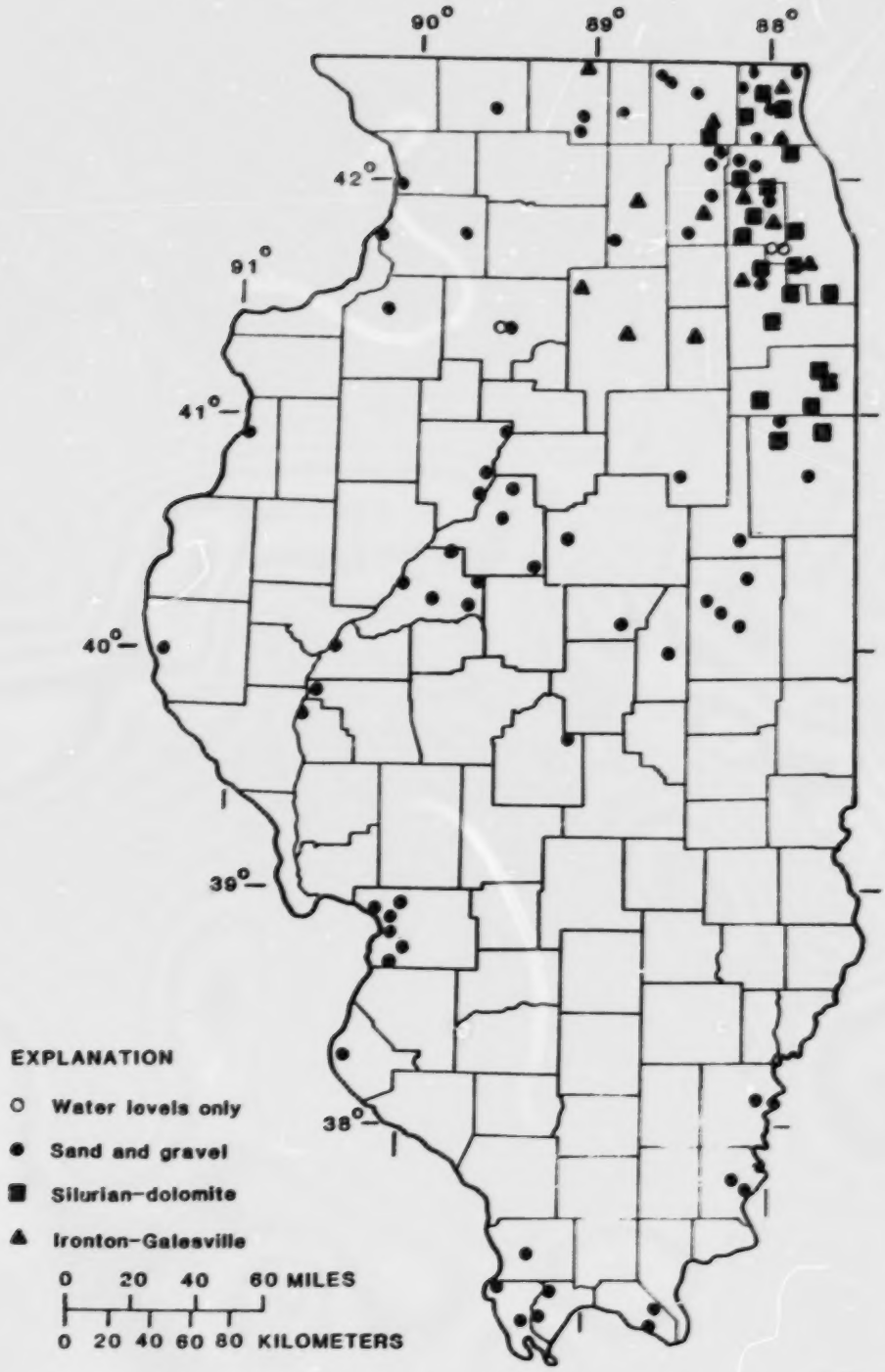

Figure 11.--Locations of wells in ground-water observation networks.

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WATSTORE

The National Water Data Storage and Retrieval System (WATSTORE) of the U.S. Geological Survey provides computerized procedures and techniques for processing water data and provides effective and efficient management of data-releasing activities. It was established in November 1971 to computerize the water-data system of the Geological Survey and to provide for more effective and efficient management of its data-releasing activities. The system is operated and maintained on the central computer facilities of the Geological Survey at its National Center in Reston, Va., and on PRIME computers in District offices throughout the Nation as part of the Distributed Information System (DIS). Data may be obtained from WATSTORE through the 46 district offices of the Water Resources Division. General inquiries about WATSTORE may be directed to:

Chief Hydrologist
U.S. Geological Survey
437 National Center
Reston, VA 22092

or

U.S. Geological Survey
Water Resources Division
4th Floor
102 East Main Street
Urbana, IL 61801.

NAWDEX

The National Water-Data Exchange (NAWDEX) is a nationwide program managed by the U.S. Geological Survey to assist users of water data or water-related data in identifying, locating, and acquiring needed data. It is a national confederation of water-oriented organizations working together to make their data more readily accessible and to facilitate a more efficient exchange of water data.

Services are available through a Program Office at the Geological Survey National Center in Reston, Va., and a nationwide network of Assistance Centers in 45 States and Puerto Rico, which provide local and convenient access to NAWDEX facilities. A directory that provides names of organizations and persons to contact, as well as addresses, telephone numbers, and office hours for each of these organizations is available on request (Josefson and Blackwell, 1982).

NAWDEX can assist any organization or individual in identifying and locating water data. To accomplish this service, NAWDEX maintains a computerized Master Water-Data Index which identifies sites for which water data are available, the type of data available for each site, and the organization

retaining the data. NAWDEX also maintains a Water-Data Sources Directory identifying organizations from which water data may be obtained. In addition, NAWDEX has direct access to some large water-data bases of its members and has reciprocal agreements for the exchange of services with others.

For additional information concerning the NAWDEX program or its services contact:

Program Office
National Water-Data Exchange (NAWDEX)
U.S. Geological Survey
421 National Center
12201 Sunrise Valley Drive
Reston, VA 22092

Telephone: (703) 860-6031
FTS 928-6031

Hours: 7:45 to 4:15 eastern time

or

NAWDEX ASSISTANCE CENTER
Illinois
U.S. Geological Survey
Water Resources Division
4th Floor
102 East Main Street
Urbana, IL 61801

Telephone: (217) 398-5353
FTS 958-5353

Hours: 8:00 to 4:30 central time

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DESCRIPTION OF PROJECTS IN 1984

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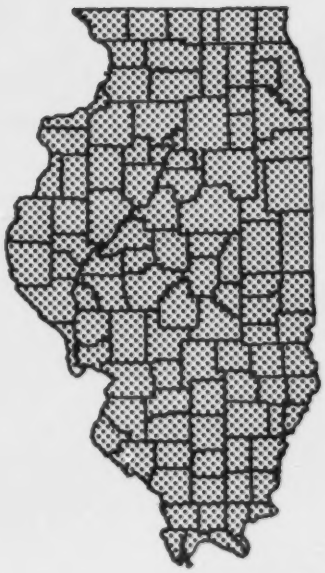
IL001 SURFACE-WATER STATIONS



*** PROJECT TITLE *** Surface-Water Stations

*** PROBLEM *** Surface-water information is needed for purposes of surveillance, planning, design, hazard warning, operation, and management, in water-related fields such as water supply, hydroelectric power, flood control, irrigation, bridge and culvert design, wildlife management, pollution abatement, flood-plain management, and water-resources development. To provide this information an appropriate data base is necessary.

*** OBJECTIVES *** A. To collect surface-water data sufficient to satisfy needs for current-purpose uses, such as (1) assessment of water resources, (2) operation of reservoirs or industries, (3) forecasting, (4) disposal of wastes and pollution controls, (5) discharge data to accompany water-quality measurements, (6) compact and legal requirements, and (7) research or special studies.

B. To collect data necessary for analytical studies to define for any location the statistical properties of, and trends in, the occurrence of water in streams, lakes, estuaries, etc., for use in planning and design.

*** APPROACH *** Standard methods of data collection will be used as described in the series, "Techniques of Water Resources Investigations of the United States Geological Survey." Partial-record gaging will be used instead of complete-record gaging where it serves the required purpose.

*** SUMMARY OF RESULTS *** Routine data collection for surface water was done for approximately 135 continuous-record gaging stations and about 24 partial-record stations. The first acoustical velocity meter in Illinois was installed and became operational in the summer of 1984 at the new gaging station Chicago Sanitary and Ship Canal at Romeoville.

*** PLANS NEXT YEAR *** Continue surface-water data collection with minor modification to the network. Install an electromagnetic velocity meter at Illinois River at Havana and an acoustical velocity meter at Illinois River at Meredosia.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** G. Wayne Curtis

*** PERIOD OF PROJECT *** Continuous since July 1930

*** COOPERATORS ***

Illinois Department of Transportation, Division of Water Resources
Illinois Department of Energy and Natural Resources, State Water Survey
Metropolitan Sanitary District of Greater Chicago
Bloomington and Normal Sanitary District
Forest Preserve District of Cook County
City of Springfield
City of Decatur
U.S. Army Corps of Engineers
    Rock Island District
    St. Louis District
    Louisville District
    Chicago District

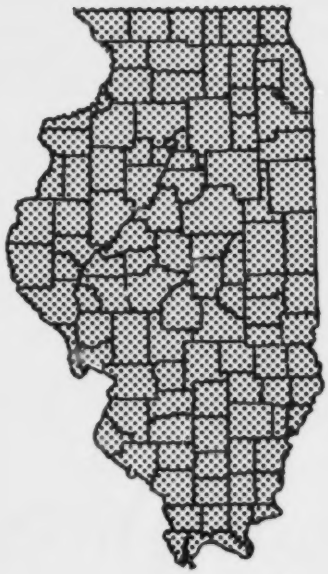
*** COMPLETED REPORTS ***

Stahl, R. L., Fitzgerald, K. K., Richards, T. E., and Hayes, P. D., 1984, Water resources data--Illinois, water year 1983, Volume 1. Illinois except Illinois River basin: U.S. Geological Survey Water-Data Report IL-83-1, 452 p.

Fitzgerald, K. K., Hayes, P. D., Richards, T. E., and Stahl, R. L., 1984, Water resources data--Illinois, water year 1983, Volume 2. Illinois River basin: U.S. Geological Survey Water-Data Report IL-83-2, 385 p.

Mades, D. M., and Oberg, K. A., 1984, Cost effectiveness of the U.S. Geological Survey's stream-gaging program in Illinois: U.S. Geological Survey Water-Resources Investigations Report 84-4123, 107 p.

IL002 GROUND-WATER STATIONS



*** PROJECT TITLE *** Ground-Water Stations

*** PROBLEM *** Water-resource planning and ground-water quantity and quality assessment require a statewide base level of relatively standardized data. In Illinois, concentrated urbanization in the northeast Chicago area and intense farming and mining in much of the State require monitoring of ground water to assess the the impact of man's activities on existing and potential water uses.

*** OBJECTIVES *** To provide a high quality of data from a network of monitoring stations across the State. To achieve timely dissemination of data from this network to all potential users in a readily usable form.

*** APPROACH *** Coordinate ground-water data gathering efforts with State, local, and other Federal agencies in Illinois. Efforts will be directed to having all participants use current and uniform data collection and reporting procedures. Data collection are planned to meet site-specific needs and to provide a statewide baseline of information from which to evaluate the general status of the State's ground-water quantity and quality.

*** SUMMARY OF RESULTS *** Measured water levels and published data.

*** PLANS NEXT YEAR *** Continue ground-water station data collection.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Gary O. Balding

*** PERIOD OF PROJECT *** Continuous since April 1982

*** COMPLETED REPORTS ***

Fitzgerald, K. K., Hayes, P. D., Richards, T. E., and Stahl, R. L., 1984, Water resources data--Illinois, water year 1983, Volume 2. Illinois River basin: U.S. Geological Survey Water-Data Report IL-83-2, 385 p.

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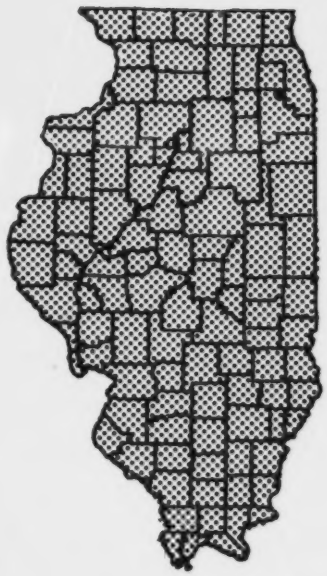
IL003 QUALITY-WATER STATIONS



*** PROJECT TITLE *** Quality-Water Stations

*** PROBLEM *** Water-resource planning and water-quality assessment require a statewide base level of relatively standardized data. In Illinois dense urbanization, especially in the northeast corner, and intense farming and mining in other parts of the State require monitoring to assess the impact of man's activities on existing and potential water uses.

*** OBJECTIVES *** To provide a high quality of data from an extensive and coherent network of monitoring stations across the State. To achieve timely dissemination of data from this network to all potential users in a readily usable form.

*** APPROACH *** Coordinate surface-water-quality data gathering efforts among the Survey and State, local, and other Federal agencies in Illinois. Efforts will be directed to having all participants use current and uniform sampling, analytical, and data reporting procedures. Sampling and the data collected are tailored to meet site-specific needs and also supply a baseline of information from which to evaluate the general nature of the State's surface-water quality.

*** SUMMARY OF RESULTS *** Quality assurance programs applied to field data collection and direct-service laboratory activities with IEPA have continued. All data from IEPA and WRD laboratories have been reviewed and prepared for publication. Discharge values have been applied to the chemical data where possible.

*** PLANS NEXT YEAR *** Continue data collection and quality assurance at about 200 stations.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Kathleen K. Fitzgerald

*** PERIOD OF PROJECT *** Continuous since June 1967

*** COOPERATORS ***
Illinois Environmental Protection Agency, Division of Water Pollution Control
Metropolitan Sanitary District of Greater Chicago

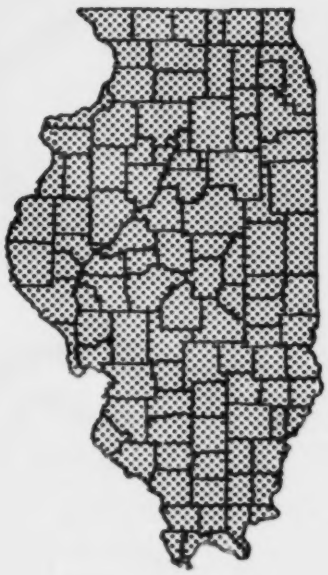
*** COMPLETED REPORTS ***

Stahl, R. L., Fitzgerald, K. K., Richards, T. E., and Hayes, P. D., 1984, Water resources data--Illinois, water year 1983, Volume 1. Illinois except Illinois River basin: U.S. Geological Survey Water-Data Report IL-83-1, 452 p.

Fitzgerald, K. K., Hayes, P. D., Richards, T. E., and Stahl, R. L., 1984, Water resources data--Illinois, water year 1983, Volume 2. Illinois River basin: U.S. Geological Survey Water-Data Report IL-83-2, 385 p.

IL004 SEDIMENT STATIONS

*** PROJECT TITLE *** Sediment Stations



*** PROBLEM *** Water-resource planning and water-quality assessment require a nationwide base level of information. Sediment concentrations and discharges in streams must be defined and monitored. A large percentage of the land in Illinois is devoted to agriculture whereby the land is exposed to erosion. Recent studies conducted under Section 208 of Public Law 92-500 have suggested sediment may be a major cause of water quality degradation in Illinois. Other activities, such as highway construction and industrial and residential development, contribute sediment to streams. Planning and regulatory agencies need a data base for evaluation of sediment transport in streams.

*** OBJECTIVES *** To provide a data bank for evaluating sediment problems in Illinois and a base from which the effectiveness of erosion control programs can be evaluated for their effect on water quality. To contribute to the national bank of sediment data for use in broad Federal and State planning and action programs and to provide data for Federal management of interstate waters.

*** APPROACH *** Establish and operate a network of sediment stations on Illinois streams to develop records of daily discharge of suspended sediment. Suspended-sediment stations will be located at long-term continuous-record surface-water discharge stations and will be used to establish relations between suspended-sediment discharge and surface-water discharge. These relations will be used to estimate long-term suspended-sediment yields of selected basins and predominant land use areas. Supplementary information at most stations will include particle-size determinations of suspended-sediment and bed-material samples.

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*** SUMMARY OF RESULTS *** Suspended-sediment samples were collected and analyzed, and daily suspended-sediment concentrations and discharges and instantaneous suspended-sediment discharges for particle-size determinations were computed for eight sites.

*** PLANS NEXT YEAR *** Prepare and publish the 1984 water year suspended-sediment data. Collect and analyze samples and compute suspended-sediment discharge record for nine sites (one new station, North Branch Chicago River at Niles, to begin October 1, 1984).

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Lawrence J. Mansue

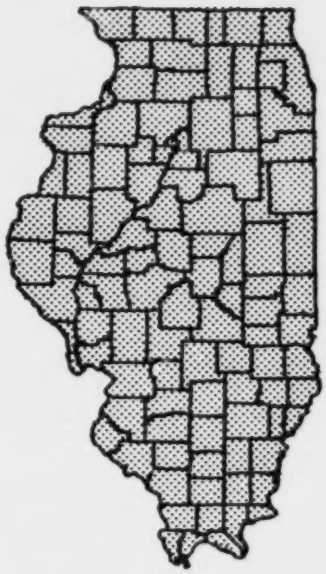
*** PERIOD OF PROJECT *** Continuous since January 1976

*** COOPERATORS ***
Metropolitan Sanitary District of Greater Chicago
U.S. Army Corps of Engineers
Rock Island District
St. Louis District

*** COMPLETED REPORTS ***
Stahl, R. L., Fitzgerald, K. K., Richards, T. E., and Hayes, P. D., 1984, Water resources data--Illinois, water year 1983, Volume 1. Illinois except Illinois River basin: U.S. Geological Survey Water-Data Report IL-83-1, 452 p.

Fitzgerald, K. K., Hayes, P. D., Richards, T. E., and Stahl, R. L., 1984, Water resources data--Illinois, water year 1983, Volume 2. Illinois River basin: U.S. Geological Survey Water-Data Report IL-83-2, 385 p.

IL006 FLOOD INVESTIGATIONS



*** PROJECT TITLE *** Flood Investigations

*** PROBLEM *** The National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 provide for the operation of a flood-insurance program. The Federal Emergency Management Agency (FEMA) needs flood studies in selected areas to determine applicable flood-insurance premium rates.

*** OBJECTIVES *** To conduct the necessary hydrologic and hydraulic evaluations and studies of areas assigned by FEMA and to present the results in an appropriate format.

*** APPROACH *** To conduct the necessary evaluations or to conduct surveys by ground or photogrammetric methods. Determine flood-discharge frequency relationships using local historical information, gaging-station records, or other applicable information. Determine water-surface profiles using step-backwater models or by other acceptable methods and furnish the results in reports prepared to FEMA specifications.

*** SUMMARY OF RESULTS *** Time and cost estimates for three county flood insurance studies (limited detail study) were submitted to FEMA.

*** PLANS NEXT YEAR *** Prepare flood-insurance studies for Federal Emergency Management Agency (FEMA) using less detailed study methods.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Allen W. Noehre

*** PERIOD OF PROJECT *** April 1984 to September 1986

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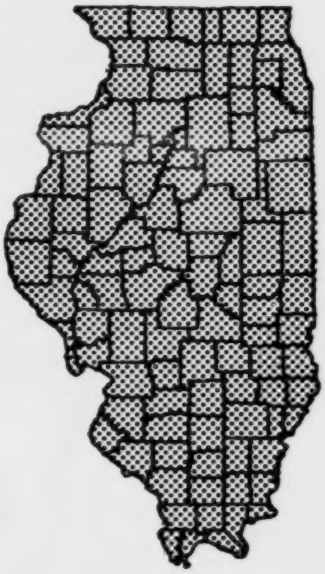
IL007 WATER USE



*** PROJECT TITLE *** Illinois Water Use Data Program

*** PROBLEM *** A water supply is adequate or not depending upon present and future demands. Information is being collected in great detail describing quantity and quality of available water in Illinois. However, water use inventories generally have been conducted only intermittently or when a water supply has been adversely affected. Competing demands for water in Illinois dictate that adequate water use information is essential for the proper distribution of available supplies.

*** OBJECTIVES *** To conduct a comprehensive, continuing, and authoritative water use inventory throughout the State of Illinois as a basis for present analyses and future projections. To develop and operate water use inventories which will be responsive to the data needs of users at the local, State, and national levels. To collect, store, and disseminate water use data to complement the data on availability and quality of the State's water resources.

*** APPROACH *** Responsibilities will be divided between the Illinois State Water Survey (ISWS) and the U.S. Geological Survey (USGS). The ISWS will collect water use withdrawal data by mailing questionnaires to water users throughout the State. The responses will be classified by water use category (public system, self-supplied industry, rural, fish and wildlife, agriculture) and aggregated by user category and location (county, hydrologic unit, aquifer, township). These aggregated data will then be entered into the National Water Use Data System (NWUDS). The USGS will, in a similar manner, collect, classify, aggregate, and prepare for entry in State files and into NWUDS water use return data. The USGS will coordinate the collection of water use data and maintain standards of data collection which will meet the National needs.

*** SUMMARY OF RESULTS *** Municipal water managers and private water users in two medium-sized Illinois cities were contacted and water delivery, release, and consumption data for calendar year 1984 were requested and data compilation begun. Eighty percent of the major private water users in one city have indicated they will supply daily water use data for at least a 2-month period of 1984. Illinois water return and withdrawal data for 1982 have been entered into the National Water Use Data System.

*** PLANS NEXT YEAR *** Continue compiling 1984 municipal and private delivery, release, and consumption data for the two cities. Prepare and enter the Illinois 1983 water return and withdrawal data into the National Water Use Data System.

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*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Timothy R. Lazaro

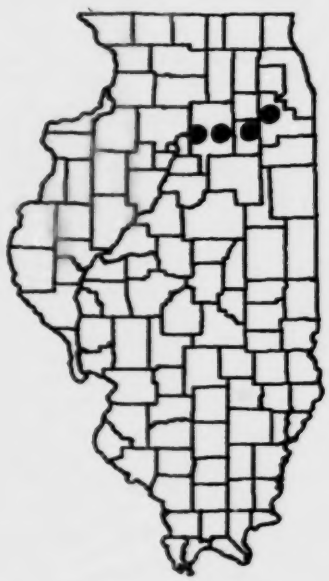
*** PERIOD OF PROJECT *** Continuous since March 1978

*** COOPERATOR ***
Board of Trustees of the University of Illinois, State Water Survey
Illinois Environmental Protection Agency

*** PLANNED REPORTS ***
Collection of Water Return Data in Illinois
Water Use in Two Illinois Cities

IL027 DAM RATINGS

*** PROJECT TITLE *** Dam Site Rating Study for Illinois River



*** PROBLEM *** Because of regulation of flows on the Illinois River by powerplant and navigation dams, adequate discharge ratings are needed to ensure that release requirements into the river below the dams are being met. Some of the dams have theoretical sluice gate and spillway ratings that were developed when the dams were constructed and the power generating equipment was new. As considerable time has passed since initial development of these ratings their current accuracy is questionable.

*** OBJECTIVES *** (1) Verify or adjust existing stage-discharge ratings. (2) Extend ratings for gated spillways, where needed, to include extreme hydrologic conditions. (3) Assess the feasibility of measuring discharge in forebays of gated-spillway sections.

*** APPROACH *** Discharge measurements will be made at Brandon Road, Dresden Island, Marseilles, and Starved Rock Dams to evaluate the accuracy of the ratings. Measurements will be made under hydrologic conditions suitable for determining poorly-defined parts of ratings or resolving problem areas. Theoretical ratings will be developed and verified using standard U.S. Geological Survey methods for gated spillways that lack current ratings. An acoustical velocity meter with magnetic compass will be used to measure flow in

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forebays at the Dresden Island Dam. Forebay measurements will be compared to main channel measurements made concurrently to assess the accuracy (feasibility) of forebay measurements.

*** SUMMARY OF RESULTS *** A series of discharge measurements were made in a forebay at Dresden Island Dam for tainter gate openings ranging from 3 to 11 feet (gate out of water). Main-channel discharge was concurrently measured as a control for the forebay measurements. Price-AA, Ott-cosine, and acoustical-velocity meters were used to determine discharge. Measurements were made at Brandon Road and Starved Rock Dams to verify ratings published by D. M. Mades in 1981. Discharge measurements were made in headrace of Illinois Light and Power Company hydroelectric-power plant to determine rating for the tainter gates that control discharge in the headrace.

*** PLANS NEXT YEAR *** Additional measurements will be made in forebay at Dresden Island Dam to determine accuracy of method for gate openings greater than 6 feet. Verification of ratings at Brandon Road, Dresden Island, Marseilles, and Starved Rock Dams will continue (emphasis is on high-flow conditions). Several series of low-flow measurements are planned for La Grange and Peoria Dams to verify published ratings for wickets and butterfly valves. Stage-discharge relations for tailwater of all six dams will be derived from discharge measurements and discharge calculated from ratings for the control structures at each dam.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** North-central Illinois

*** PROJECT CHIEF *** Dean M. Mades

*** PERIOD OF PROJECT *** October 1977 to September 1981
October 1983 to September 1985

*** COOPERATOR ***
U.S. Army Corps of Engineers, Rock Island District

*** PLANNED REPORT ***
Estimating Discharge at Dams on the Illinois Waterway

*** PROJECT TITLE *** Water Monitoring in Coal Mining Areas for P.L. 95-87, Illinois

*** PROBLEM *** Section 507(b)(11) of the Surface Mining Control and Reclamation Act of 1977 (P.L. 95-87) requires the appropriate Federal or State agency to provide applicants for coal mining permits, hydrologic information on the general area in order for the applicant to make a determination of the probable hydrologic consequences of the proposed mining. This is to form the basis for an assessment by the regulatory authority of the probable cumulative impacts of coal mining on the hydrology of the area. Existing hydrologic networks were not designed with these needs in mind and hence are neither adequate in coverage or in the types of data being acquired.

*** OBJECTIVES *** To monitor the general hydrologic conditions of the State where significant areas are affected by active and potential coal mining operations. (1) Conduct water-quantity and water-quality reconnaissance surveys of streams in mine-affected areas to collect the data necessary for designing a hydrologic network for monitoring coal mining areas. (2) Sample strip-mine lakes in all mine-affected areas of the State to collect data that describe the general hydrology and chemical character of these lakes. (3) Inventory existing ground-water-quality data and insure that a sufficient data base exists to evaluate the effects of coal mining on the ground-water hydrology of intensely mined areas.

*** APPROACH *** Categorize mined areas in the State by intensity and type of mining. Develop a surface-water and water-quality reconnaissance program from which a monitoring network will evolve. Conduct semi-annual sampling of strip-mine lakes during the reconnaissance surveys and consider establishment of a lake monitoring network. Inventory existing ground-water-quality data in the mine-affected areas and determine ground-water data needs to adequately define the effects of coal mining on ground-water hydrology. Formulate, if necessary, a ground-water data collection network.

*** SUMMARY OF RESULTS *** Area 31 is located in southeastern Illinois and southwestern Indiana and covers about 4,500 square miles. Major streams include the Little Wabash River and the lower Wabash River. Agriculture is the dominant land use, 67 percent cropland and 9.8 percent pasture. One underground coal mine was in operation as of December 1983. Average annual precipitation ranges from 39 to 44 inches. Thin glacial till underlies 5 to 15 feet of loess. Pennsylvanian age rocks, which consist of sandstone, limestone, siltstone, shale, clay, and coal, underlie the tills. Streamflow data are available for 29 locations including 10 continuous record gaging stations, 10 crest-stage and 2 low-flow partial-record stations, and 7 sites where miscellaneous water discharge

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measurements were made. Average streamflow and high flow can be estimated at ungaged sites in the area. Surface-water-quality samples were collected at 16 sites and were analyzed for specific physical and chemical properties; specific conductance values ranged from 120 to 2,200 micromhos per centimeter at 25 degrees Celsius. Ground water is available from unconsolidated aquifers located in buried bedrock valleys and in bedrock aquifers in most other parts of the area. Water in the deep bedrock aquifers is highly mineralized.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois - Eastern Interior Coal Province

*** PROJECT CHIEF *** Elmer E. Zuehls

*** PERIOD OF PROJECT *** October 1978 to September 1984

*** REPORTS IN PROCESS ***

Hydrologic Assessment of Interior Coal Province, Eastern Region Area No. 27
Hydrologic Assessment of Interior Coal Province, Eastern Region Area No. 28
Hydrologic Assessment of Interior Coal Province, Eastern Region Area No. 31

*** COMPLETED REPORT ***

Fitzgerald, K. K., Peters, C. A., and Zuehls, E. E., 1983, Hydrology of Area 29, Eastern Region, Interior Coal Province, Illinois: U.S. Geological Survey Water-Resources Investigations Open-File Report 82-858, 70 p.

IL034 REGIONAL AQUIFER STUDY IN ILLINOIS

*** PROJECT TITLE *** Hydrogeologic Assessment of the Northern Midwest Regional Aquifer in Illinois

*** PROBLEM *** Because the Northern Midwest Regional Aquifer is a major source of water for the north-central part of the United States, a regional study of its water availability and quality, its development, and its potential is needed. Illinois is a major State in this regional study and as such the Illinois district, in cooperation with State agencies involved in ground-water studies, will need to supply much of the input data.

*** OBJECTIVES *** To supply needed data to the Regional Aquifer System Analysis (RASA) program while refining our understanding of the deep aquifers (Cambrian-Ordovician and Mount Simon aquifers) in Illinois. Data on stratigraphy, structure, mineralogy, ground-water levels, ground-water quality, aquifer hydraulics, and pumpage are necessary to describe the aquifer and to predict its response to planned development.

*** APPROACH *** The following types of data will be collected: Pumpage and water use; recharge-discharge relationships; water-level data, structural contour, isopach, and facies maps of several geohydrologic units; and hydraulic characteristics and water-quality data for the aquifer units. A digital model of the Rockford area, miscellaneous maps of hydrogeologic and quality-of-water parameters, and a summary report will be prepared.

*** SUMMARY OF RESULTS *** Two planned reports have received Director's approval and are undergoing final revisions prior to publication.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Northern Illinois

*** PROJECT CHIEF *** Marvin G. Sherrill

*** PERIOD OF PROJECT *** October 1978 to September 1982
October 1983 to September 1984

*** PLANNED REPORT ***
A Digital-Computer Model for Estimating Drawdowns in the Cambrian-Ordovician Aquifer System in North-Central Illinois

*** REPORTS IN PROCESS ***
Report on the Cambrian and Ordovician Aquifers in Northern Illinois
Report on the Deep Stratigraphic Test Well near Zion, Illinois

IL036 DETENTION PONDS

*** PROJECT TITLE *** Effects of Detention Ponds on Water Quality

*** PROBLEM *** Information collected during the development of the 208 plan for northeastern Illinois identified storm-water runoff as a major water-quality problem. The utilization of detention basins as a management strategy in urban areas seems to offer considerable potential for improving the quality of storm-water runoff. A quantitative demonstration of the improvement in stream quality attributable to storm-water detention is needed. Reliable data on quantity and quality of water upstream and downstream from a detention pond in an urban area are primary requisites in this demonstration.

*** OBJECTIVE *** To provide reliable quantity and quality data on urban storm-water runoff prior to and after detention.

*** APPROACH *** Lake Ellyn acts as an 11 acre detention pond for 535 acres of maturely developed urban area with mixed land use in Glen Ellyn. Discharge, precipitation, and water-quality data were collected for 2 years in the watershed as part of the National Urban Runoff Program including three sites on the lake, one at the main inlet and one at each of two outlets. The project is reactivated to analyze these data using regressionally derived relations between water-quality measurements and runoff statistics of peak flows, storm volumes, and antecedent rainfall conditions. Emphasis will be on the total amounts of material transported and detained. Results will be compared to measurements made at other locations as reported in the literature or obtained from other researchers.

*** RESULTS THIS YEAR *** Final draft of project report has been completed and has received district review. Comments have been incorporated into report for colleague review.

*** HEADQUARTERS *** De Kalb, Illinois

*** FIELD LOCATION *** Northeastern Illinois

*** PROJECT CHIEF *** Robert G. Striegl

*** PERIOD OF PROJECT *** January 1979 to September 1981
March 1983 to January 1984

*** REPORTS IN PROCESS ***
Effects of Storm-Water Runoff on an Urban Lake, Lake Ellyn at Glen Ellyn
Effects of an Urban Lake on Water Quality: Lake Ellyn at Glen Ellyn, Illinois

IL042 GROUND-WATER FLOW--NUCLIDE MIGRATION

*** PROJECT TITLE *** Determination of Ground-Water Flow and Tritium Migration from Sheffield Low-Level Radioactive-Waste Site to the Hydrologic Boundary

*** PROBLEM *** In determining suitability of low permeability glacial sediments to contain radionuclides the identification of flow paths is a key element. The study concerns a pebbly-sand unit underlying 67 percent of the site. The problem involved mapping the pebbly sand east of the site and to determine its connection with a strip-mine lake and a stream. A ground-water flow model will be developed for the ground-water flow system. Tritium migrating east of the site is moving along a channel in the pebbly sand. An additional part of this study is to determine the extent of migration.

*** OBJECTIVES *** To determine the areal extent of the tritium plume and the distribution of tritium concentrations. To determine the source of tritium, i.e., identify specific trench. To determine nature of tritium plume, i.e., slug release or continuous release. To determine rate of movement. To determine the mechanism for movement.

*** APPROACH *** Drill test wells in phases to delineate areal extent of plume. Sample water from each well biweekly or monthly for tritium analysis. Analyze soil samples to determine grain-size distribution and clay mineralogy for purposes of correlating with nearby stratigraphic units. Perform field tests to determine hydraulic properties of principal water bearing unit. Develop solute transport model.

*** SUMMARY OF RESULTS *** Ground-water modeling has been completed. Author's rough draft of final report was begun.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** North-central Illinois

*** PROJECT CHIEF *** James B. Foster

*** PERIOD OF PROJECT *** October 1980 to September 1984

*** COOPERATORS ***
Illinois Department of Nuclear Safety

*** REPORTS IN PROCESS ***
Measurement of Ground-Water Velocity Using Rhodamine WT Dye near Sheffield
Ground-Water Models at Sheffield Site

*** COMPLETED REPORTS ***

Foster, J. B., Garklavs, George, and Mackey, G. W., 1984, Hydrogeologic setting east of a low-level radioactive-waste disposal site near Sheffield, Illinois: U.S. Geological Survey Water-Resources Investigations Report 84-4183, 20 p.

---- 1984, Geologic and hydrologic data collected during 1976-1984 at the Sheffield low-level radioactive-waste disposal site and adjacent areas, Sheffield, Illinois: U.S. Geological Survey Open-File Report 83-926, 261 p.

IL043 EROSION AT SHEFFIELD SITE

*** PROJECT TITLE *** Erosion and Landform Modification at Sheffield, Illinois, Low-Level Radioactive-Waste Disposal Site

*** PROBLEM *** Long-term retention of low-level radioactive wastes at the Sheffield radioactive-waste disposal site requires maintenance of the integrity of burial trenches and their caps as erosion reduces the surface and removes soil from exposed trench walls. Erosion can cause the following problems: (1) Reduction of stability of caps because of steepened slopes caused by gully and channel erosion; (2) slope failure due to infiltration; (3) encroachment of valleys upon trenches because of long-term land form modification; and (4) increased sediment yield to streams because of increased runoff and decreased cover.

*** OBJECTIVES *** (1) To determine rainfall-runoff relations for the site; (2) measurement of sediment yield and determination of the relationship of sediment discharge to runoff for the site; (3) determination of the types and rates of geomorphic change within the area; (4) determination of potential for erosion and slumping and identification of specific problem areas; and (5) development of a data base to which changes caused by changing practices on the site can be compared.

*** APPROACH *** Gaging stations equipped with stage recorders and automatic samplers will be established to collect data to compute sediment discharge from four watersheds less than 10 acres, three of which will be located on-site to evaluate erosion rates, and one located off-site as an experimental control. Runoff and sediment discharge from four small watersheds (each under an acre in size), two located within the control watershed, will be computed from data obtained by dekaport divisor systems. Five recording rain gages will provide rainfall distribution data for the site and control watershed. Photographic surveys and channel cross sections will be made to aid in defining land-surface

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changes. Data describing precipitation, runoff, and sediment discharge will be used with a precipitation-runoff model to evaluate long-term sediment yields from the study areas.

*** SUMMARY OF RESULTS *** Preliminary results from July 1982 through July 1984 indicate that the mean annual precipitation of 35 inches measured at the site (equal to the long-term mean for the area) resulted in an average of 22 percent runoff and 74 percent evapotranspiration. The balance of 4 percent water infiltrated the subsurface. Only 3 percent of precipitation ran off from a nearby undisturbed basin in this same period. Runoff seldom exceeded 1 percent of precipitation at plots located atop trench covers. Annual sediment yields from the site were approximately 2 tons per acre. Greatest mean annual yields, exceeding 6 tons per acre, were measured from the northwestern part of the site; lowest yields, less than 0.1 ton per acre, occurred from the central plateau of the site. Annual mean sediment yields from the undisturbed basin totaled 0.004 ton per acre. Two-hundred and forty-three subsidences were documented at the site from November 1978 through May 1984. Almost two-thirds of the subsidences occurred in the months of February, March, and April. Subsidences at or near the periphery of waste-disposal trenches comprised 70 percent of the total.

*** PLANS NEXT YEAR *** Continue data collection through April. Compute and check runoff and sediment yields. Assess relations among rainfall, runoff, and sediment transport, and subsidence. Simulate runoff and sediment transport processes via HSPF model. Evaluate long-term water and sediment yields with model using climatic data from nearby NOAA stations.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** North-central Illinois

*** PROJECT CHIEF *** John R. Gray

*** PERIOD OF PROJECT *** October 1980 to September 1985

*** PLANNED REPORT ***

Runoff, Sediment Transport, and Landform Modifications at a Low-Level Radioactive-Waste Disposal Site near Sheffield, Illinois

*** COMPLETED REPORT ***

Gray, J. R., and deVries, M. P., 1984, A system for measuring surface runoff and collecting sediment samples from small areas, in Meyer, E. L., ed., Selected papers in the hydrologic sciences: U.S. Geological Survey Water-Supply Paper 2262, p. 7-11.

IL044 SHEFFIELD UNSATURATED FLOW

*** PROJECT TITLE *** Hydrology of Unsaturated Flow through Porous Media at the Low-Level Radioactive-Waste Disposal Site near Sheffield, Illinois

*** PROBLEM *** In developing criteria to be used in selecting future radioactive-waste disposal sites and improving operations at current sites, it is necessary to understand the mechanisms that control transport of radionuclides by soil moisture flow in unsaturated porous media. Research in this area has been directed mainly towards theoretical aspects and laboratory experiments of soil moisture movement in the root zone. The tunnel at Sheffield beneath four trenches offers the opportunity to study moisture movement in a field situation through as much as 35 feet of unsaturated sediments. Instruments will be installed on the land surface and in the tunnel to obtain data on soil moisture movement to the water table and any radionuclide migration from trenches to the water table. Existing techniques and instrumentation will have to be modified to fit unusual conditions.

*** OBJECTIVES *** To qualify and quantify the mechanisms that control the movement of water and transport of radionuclides from disposal trenches through the unsaturated zone to the water table. The soil moisture data will provide a basis for research on burial site design and construction techniques. As an example, these data would provide the basis for evaluating new trench cap construction techniques for reducing infiltration and in the design of radionuclide waste trenches.

*** APPROACH *** Soil moisture and suction data will be obtained in the field using a neutron soil moisture probe and tensiometers. Soil moisture chemistry will be determined from samples collected with soil suction lysimeters. Gamma spectral logging will be used to monitor changes in radionuclide content of soil and soil water. Evapotranspiration will be computed using data obtained from a meteorological station. Tracers will be used to determine dispersivities. Models of unsaturated moisture flow and solute transport will be used.

*** SUMMARY OF RESULTS *** Data collection was discontinued, as planned, in June for the meteorological station and the tensiometers installed within the trench cover. Data collection continued from tensiometers installed in the tunnel. The hydrologic budget for the period July 1983 to June 1984 was computed to be 900 mm of precipitation, 165 mm of runoff, 700 mm of evapotranspiration, and 35 mm of recharge. This was very similar to the previous year, although the distribution of precipitation was quite different. Wetting fronts from precipitation moved completely through the trench cover (encountering waste) only during early spring. During the remainder of the year all infiltrated water was stored within the trench cover.

PLANS NEXT YEAR *** Continue data collection from the tunnel. Finish analyzing data. Prepare reports.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** North-central Illinois

*** PROJECT CHIEF *** Richard W. Healy

*** PERIOD OF PROJECT *** October 1980 to September 1985

*** PLANNED REPORTS ***

Soil Moisture Movement and Radionuclide Transport at a Low-Level Radioactive-Waste Disposal Site
Evapotranpsiration from a Field of Pasture Grass in Northwestern Illinois
Water Movement Through Trench Covers at a Low-Level Radioactive-Waste Site
Water Chemistry Within the Unsaturated Zone at a Low-Level Radioactive-Waste Site

*** REPORT IN PROCESS ***

Concepts and Data Collection Techniques used in a Study of the Unsaturated Zone at a Low-Level Radioactive-Waste Disposal Site near Sheffield

IL049 TRITIUM MIGRATION, ILLINOIS

*** PROJECT TITLE *** Tritium Migration in a Shallow Dolomite Aquifer near Chicago, Illinois

*** PROBLEM *** Tritium has entered a dolomite aquifer beneath a low-level radioactive-waste disposal site located in a forest preserve near Chicago, Illinois. Tritium has been detected in water from a nearby public well owned by the forest preserve. Two wells located between the burial site and the public well show no significant amount of tritium in their water. Additional data on the geologic and hydrologic factors which control the direction and rate of tritium migration are needed to explain the occurrence of tritium in the public well.

*** OBJECTIVES *** (1) Describe the geologic and hydrologic factors which control the direction and rate of tritium migration. (2) Describe the migration of tritium from the burial site to the public well; (A) Explain why tritium is not detected in intervening observation wells and (B) explain seasonal fluctuations

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in the concentration of tritium in the public well. (3) Describe the successes and failures of techniques used to collect, analyze, and interpret data from a low-level radioactive-waste disposal site.

*** APPROACH *** (1) Drill several wells into the dolomite and conduct aquifer tests. (2) Sample wells to determine tritium concentration in water. (3) Collect data on the geological and geophysical character of the dolomite. (4) Compile and evaluate hydrologic, water quality, and geologic data.

*** SUMMARY OF RESULTS *** Completed data collection and analysis. Modeled several ground-water flow scenarios to test hypotheses. Rough draft of report is being written.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Northeastern Illinois

*** PROJECT CHIEF *** James R. Nicholas

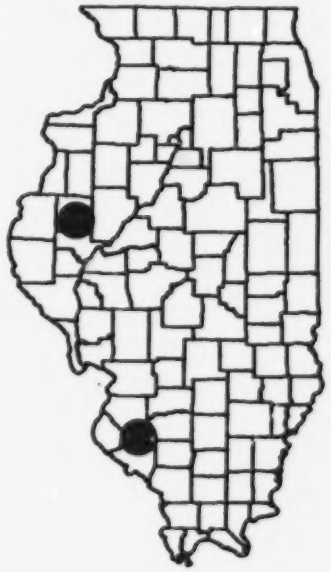
*** PERIOD OF PROJECT *** October 1981 to September 1984

*** PLANNED REPORTS ***
Tritium Migration from a Low-Level Radioactive Waste Disposal Site near Chicago, Illinois

IL051 RESEARCH MODELING IN COAL AREAS

*** PROJECT TITLE *** Precipitation-Runoff Modeling of Coal Strip-Mining Areas in Illinois

*** PROBLEM *** Strip mining for coal alters natural runoff and changes the physical and chemical characteristics of the effluent streams. Methods are needed to detect, quantify, and predict the effects of strip mining on the hydrologic environment. The collection and analysis of hydrologic data in conjunction with the development of digital computer models such as the U.S. Geological Survey Precipitation-Runoff Model will be necessary to evaluate these impacts.



*** OBJECTIVES *** To describe the hydrology and land use practices of two small basins permitted for surface coal mining, and to simulate surface water quantity with two rainfall-runoff models.

*** APPROACH *** Two small basins in which a high degree of mining activity is planned have

been selected, one each in the major coal mining regions of western and southern Illinois. Hydrologic data will be gathered documenting surface-water flow, sediment transport, and water quality. Weather stations will be erected at both sites to provide radiation, air temperature, humidity, wind speed, and precipitation data. Overall, the data will be used to describe the hydrology of the basins and to calibrate, verify, and test a model for predicting the strip-mining impacts.

*** SUMMARY OF RESULTS *** Streamflow simulation of Grindstone Creek Tributary using Precipitation-Runoff Modeling System and Hydrologic Simulation Program FORTRAN has been completed.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

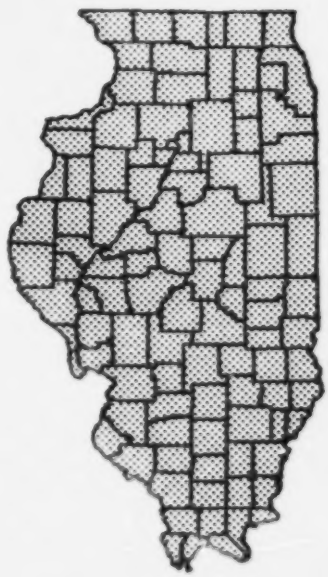
*** FIELD LOCATION *** Western and southern Illinois

*** PROJECT CHIEF *** Jane V. Borghese

*** PERIOD OF PROJECT *** October 1981 to September 1984

IL057 MINING IMPACTS ON GROUND WATER

*** PROJECT TITLE *** Surface-Mining Impacts on Ground-Water Hydrology



*** PROBLEM *** Mining companies in Illinois are required by the State to assess the probable consequences of ground-water level changes resulting from surface mining of coal. Although many analytical and numerical techniques for estimating ground-water flow and water levels have been published, both mining companies and regulatory agencies need a general method to aid in application of models to assessment of impacts of mining in a given situation.

*** OBJECTIVES *** To develop a general method that can be used with data typically available before mining and to estimate changes in water level and ground-water flow caused by surface mining.

*** APPROACH *** Areas with hydrogeologic situations typical of those in which strip mining in Illinois occurs will be selected, and a generalized geologic cross section of each developed. Two-dimensional ground-water flow will be simulated for each cross section using a numerical computer model. Boundary conditions, aquifer characteristics, and

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mine-pit configurations will be varied, with data input limited to types of field data available prior to mining. Graphs of drawdown versus distance and discharge versus time will be drawn from the set of solutions using dimensionless variables.

*** SUMMARY OF RESULTS *** The numerical model VS2D (Lappala) has been modified to simulate ground-water drainage to surface coal mines. Generic aquifers have been chosen to represent characteristics typical of Illinois surface coal-mining regions. Head and discharge values obtained by simulating drainage through the generic aquifers using VS2D were nondimensionalized and presented in tabular format. A technique was developed which uses the tables, aquifer characteristics typically available prior to mining, and some simple equations. Application of the technique was written as a user's manual; development of the technique was written as an Appendix to the user's manual.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Linda S. Weiss

*** PERIOD OF PROJECT *** October 1982 to September 1984

*** PLANNED REPORT ***
Surface Mining Impacts on Ground-Water Hydrology

IL058 SURFACE-MINE LAKES, AREA 35

*** PROJECT TITLE *** A Reconnaissance of Surface-mine Lakes in Area 35, Eastern Region, Interior Coal Province, Illinois

*** PROBLEM *** Numerous lakes have been formed by incomplete filling of surface-mine excavations. Area 35 in the Eastern Region, Interior Coal Province, is one of the most active mining areas in Illinois. The Office of Surface Mining (OSM) and the Illinois Environmental Protection Agency (IEPA) estimate that many of the permit applications in the near future will be in this area. The general quality of these lakes is not well known, thus little information is available upon which OSM and IEPA can predict the quality of future surface-mine lakes.

*** OBJECTIVES *** To document the location of and provide descriptive information for lakes formed by surface coal mining in Area 35 of the Eastern Interior Coal Province in Illinois.

Descriptions will be general in nature and include characteristics which can be observed or measured in the field such as lake morphology and measurements of physical and chemical properties of the lake water.

*** APPROACH *** Identification of surface-mine lakes will be made from a study of topographic maps and aerial photographs, and through consultation with coal companies and local universities. The reconnaissance will include only those lakes greater than 10 acres in size which are accessible. Data tabulations will include latitude and longitude, lake morphology (length, width, area, and maximum depth), light penetration into the water column using a secchi disk, and a single surface to bottom profile measurement of DO, pH, temperature, and specific conductance made at the point of maximum depth. Lakes will be visited once between spring and fall 1983.

*** SUMMARY OF RESULTS *** Several sites were revisited to make check measurements on some anomolously high dissolved-oxygen values. This information was used to finalize the report prior to transmittal for Director's approval. The report has been sent for Director's approval.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Southern Illinois

*** PROJECT CHIEF *** David C. Voelker

*** PERIOD OF PROJECT *** October 1982 to September 1984

*** REPORT IN PROCESS ***
A Gazetteer of Surface-Mine Lakes in Area 35 of the Eastern Interior Coal Province, Illinois

IL059 RECHARGE POTENTIAL - NW ILLINOIS

*** PROJECT TITLE *** Recharge Potential to the Shallow Dolomite Aquifer in Northwestern Illinois

*** PROBLEM *** Contamination of ground water is a concern in many parts of northwestern Illinois where the Galena-Platteville Group, a jointed and fractured dolomite and limestone, lies at or near the surface. The Galena-Platteville Group is a highly used aquifer in this part of the State and also recharges the underlying Cambrian-Ordovician aquifers. The study area, about 5,000 square miles, includes the "Driftless Area" in the extreme northwest corner of Illinois, which has no drift cover or is covered by a thin silty soil. The remainder of the study area is covered by a variable and thin glacial drift cover. These areas need to be evaluated in relation to ground-water movement and recharge potential.

*** OBJECTIVES *** To provide useful, interpretive maps and explanatory text concerning the recharge and contamination potential of the unconfined Galena-Platteville Aquifer.

*** APPROACH *** Five maps will be prepared: (1) Bedrock geologic map, delineating the unconfined part of the Galena-Platteville Aquifer, (2) unconsolidated materials thickness map, (3) unconsolidated materials permeability map, (4) generalized water table map, and (5) an interpretive ground-water recharge and contamination-potential map.

*** SUMMARY OF RESULTS *** Report has been completed and is in the review process.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Northwestern Illinois

*** PROJECT CHIEF *** Jane V. Borghese

*** PERIOD OF PROJECT *** January 1983 to January 1984

*** REPORT IN PROCESS ***
Recharge Potential to the Shallow Dolomite Aquifer in Northwestern Illinois

IL060 ILLINOIS STREAM QUALITY MODELING

*** PROJECT TITLE *** Illinois Stream Quality Modeling: Du Page River and Richland Creek Basins, Illinois

*** PROBLEM *** Both Richland Creek and the Du Page River drain predominantly urban areas (248 and 324 square miles, respectively). During warm-weather low-flow periods, the concentrations of dissolved oxygen, in both streams, fall below the State standard of 5.0 milligrams per liter. High concentrations of nitrogen and carbon from wastewater treatment facilities in these basins cause some of the dissolved-oxygen demand. Degradation of sediment material and algal growth and respiration use dissolved oxygen. Nutrient loads to the streams support algal growth and thus have an affect on the levels of dissolved oxygen in the stream. The impacts of these sources of oxygen demand or the stream's dissolved-oxygen concentrations must be assessed.

*** OBJECTIVES *** (1) Describe the water quality during low-flow periods. (2) Identify stream reaches that do not meet State water-quality standards. (3) Identify the cause and effect relations of processes in those reaches failing to meet State standards by use of a calibrated low-flow model.

*** APPROACH *** Water-quality data, including ultimate biochemical oxygen demands, constituent concentrations (dissolved oxygen, ammonia, nitrite plus nitrate, phosphorus), pH, specific conductance, and air and water temperatures, will be collected twice (over 24-hour periods) for each stream. These data collections will be during warm-weather low-flow periods and at differing waste-loading or hydrologic conditions. Measurements of sediment oxygen demand, reaeration rate, traveltime, and algal primary productivity will also be made. Regression analysis will be used to develop equations to relate reaeration rate and calibrated and verified with this data. The model will be used to assess cause and effect relations of stream process.

*** SUMMARY OF RESULTS *** The water quality and cause and effect relation of several physical, chemical, and biological processes in the Du Page River were determined using measured data and computer simulations. All modeling work is complete and the first draft of the report for the Du Page River is complete. The reults showed that State standards for dissolved oxygen and ammonia were not met in the downstream 8 miles of the East Branch Du Page River. Model simulations indicated that the most important process causing dissolved-oxygen depletion in this reach was sediment-oxygen demand. Wastewater treatment facility effluent discharges contribute the major portion of the ammonia in the stream during low-flow periods.

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Data collection for Richland Creek is complete. This data was collected during the warm-weather low-flow period of June through August 1984. The results show two to three reaches with low dissolved-oxygen concentration. The most severe of these reaches is just downstream of the city of Belleville and its wastewater treatment facility.

*** PLANS NEXT YEAR *** Revise the Du Page report and send out for colleague review. Calibrate and verify a water-quality model using the Richland Creek data. Perform sensitivity analyses and model simulations to determine the cause and effect relations of processes in critical reaches of Richland Creek. Prepare a report describing the data collection, data analysis, and modeling results for Richland Creek.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Northeastern and Southwestern Illinois

*** PROJECT CHIEF *** Ward O. Freeman

*** PERIOD OF PROJECT *** April 1983 to September 1985

*** COOPERATOR ***
Illinois Environmental Protection Agency

*** PLANNED REPORT ***
Assessment of Water Quality in Richland Creek

*** REPORT IN PROCESS ***
Assessment of Water Quality in the Du Page River

IL061 PEAK FLOW SKEW

*** PROJECT TITLE *** Distribution of Log-Pearson III Skew Coefficient for Annual Peak Discharge at Stream-Gaging Stations in Illinois

*** PROBLEM *** Cost effective bridge and culvert design for waterways that are ungaged is very dependent on accurate estimates of peak discharge. Techniques for estimating peak discharge at ungaged locations in Illinois for various recurrence intervals, use the WRC regional estimates for skewness. There is a critical need to evaluate the appropriateness of the regional skew coefficients in Illinois.

*** OBJECTIVES *** (1) To develop a procedure for estimating the log-Pearson III skew coefficient at ungaged areas in Illinois. (2) To evaluate differences between the procedure developed and the regional skew coefficients. (3) To evaluate the change in standard errors associated with existing peak-flow estimating equations resulting from revised estimates of skewness.

*** APPROACH *** Three methods will be used to determine a procedure for estimating skew coefficients at ungaged areas. Stations from nearby States will be included in the analysis to eliminate "State-line" boundary effects.

The three methods for estimating skew coefficients will be compared to determine which one is most accurate. This method will be compared to WRC regional skew coefficients. The techniques for estimating peak discharge at ungaged areas in Illinois will be reevaluated using the new skew estimates to quantify the change in standard errors for each regional regression equation.

*** SUMMARY OF RESULTS *** The mean, standard deviation and skew of the log-Pearson III distribution were calculated for the annual series of peak discharge at 775 stations in Illinois and adjacent States. Stations having significant regulations or diversion of peak discharge and urbanization in the basin were identified. A computerized data base composed of log-Pearson III statistics for each station was created. Preliminary estimates of the WRC skew map error were computed.

*** PLANS NEXT YEAR *** The WRC skew map error in Illinois will be determined. Three methods for estimating generalized skew will be evaluated. The most accurate method will be selected. Estimates of peak discharge for various recurrence intervals using the skew from the selected method and the WRC method will be compared. A report will be published.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Dean M. Mades

*** PERIOD OF PROJECT *** October 1983 to September 1985

*** COOPERATOR ***
Illinois Department of Transportation, Division of Water Resources

*** PLANNED REPORT ***
Estimating of Flood Peak Skew Coefficients in Illinois

IL062 GW-QW NETWORK

*** PROJECT TITLE *** Illinois Ground-Water Observation Network

*** PROBLEM *** Increasing water needs and contamination of ground-water resources in Illinois and throughout the Nation make it necessary to evaluate present and estimate future quantity and quality of these resources. Planning, management, and regulatory agencies need reliable hydrologic information to manage and protect Illinois' water resources. Long-term records of ground-water levels and quality are needed to evaluate the effects of climatic variations on the ground-water system, to provide a consistent data base from which to evaluate effects of development and use, and to aid in the prediction of the quality and quantity of future supplies.

*** OBJECTIVES *** (1) Establish a network of wells representative of major geohydrologic units in Illinois. (2) Operate a ground-water observation network to collect water-level and water-quality data to (a) describe baseline conditions in each geohydrologic unit, (b) investigate trends in ground-water quality and quantity, and (c) to establish a manageable data base which can be used in preparing periodic assessments of Illinois' ground-water resources.

*** APPROACH *** (1) Select approximatey 400 wells to represent major geohydrologic units in Illinois. (2) Complete well schedules and enter data into WATSTORE-GWSI. (3) Prepare in-house guidelines for sampling each well type based on construction and accessibility. (4) Measure water levels and sample wells for a group of water-quality characteristics agreed upon by the Illinois Environmental Protection Agency and U.S. Geological Survey. (5) Prepare reports annually on progress and during FY 87 to analyze changes observed during first 3 years and determine long-term network sampling plans.

*** SUMMARY OF RESULTS *** One hundred and four wells were selected and sampled for the pilot project of the ground-water monitoring network. Water quality, water level, and pumping data were collected during the visit to the sites, with well schedules being completed in the office. Wells are located throughout the State and represent three major aquifers: (1) Sand and Gravel; (2) Silurian Dolomite; and (3) Ironton Galesville.

*** PLANS NEXT YEAR *** Continue sampling program and expand network.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** David C. Voelker

*** PERIOD OF PROJECT *** October 1983 to September 1987

*** COOPERATOR ***
Illinois Environmental Protection Agency

*** PLANNED REPORTS ***
Ground-Water Observation Network--Well Data, 1984
Ground-Water Observation Network--Well Data, 1985
Ground-Water Observation Network--Well Data, 1986
Observation of Ground-Water Levels and Quality in Illinois

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IL063 GAS TRANSPORT--SHEFFIELD

*** PROJECT TITLE *** Transport of Radioactive Gases in the Unsaturated Zone at a Low-Level Radioactive-Waste Site, Sheffield, Illinois

*** PROBLEM *** Development of site and management criteria for the underground disposal of radioactive wastes requires that mechanisms which control the transport of radionuclides to offsite areas be understood, and that the relative importance of identified transport pathways be quantified. Analyses of reconnaissance samples of gases collected from the unsaturated zone at the low-level radioactive-waste site near Sheffield show the presence of above background concentrations of several radioactive gases indicating a potential for the molecular diffusion of the enriched gases through the unsaturated zone. Environmental sinks for the transported radionuclides include the atmosphere, the local ground water and soil water, and the biosphere.

*** OBJECTIVES *** To identify the major gas species responsible for the transport of radionuclides in the unsaturated zone; to determine the horizontal concentration gradient of carbon-14 dioxide and tritiated water vapor in a porous sand deposit adjacent to buried radioactive wastes; and to calculate the rate of mass transport of radioactive gases in the unsaturated sand using measured concentration data.

*** APPROACH *** Soil gas sampling tubes will be installed in glacial deposits along a line perpendicular to buried radioactive wastes. Collected gases will be analyzed to determine the partial pressures of major gases in the soil atmosphere. Carbon gases and water vapor will be separated from the soil atmosphere and the radioactivity of individual gases will be measured. Partial pressure and radioactivity data will be used to calculate the mass transport of radioactive gases through the unsaturated zone near the burial site.

*** SUMMARY OF RESULTS *** Five gas sampling tubes have been installed in each of three boreholes drilled near buried wastes. Analyses of samples collected at four times during FY 84 show gradients of CO_2, $^{14}CO_2$, CH_4, and 222-radon in the unsaturated zone. A two-dimensional finite-difference model is being developed to evaluate diffusion of measured gases through the unsaturated zone and to the atmosphere.

*** PLANS NEXT YEAR *** Data collection will continue and data analyses will begin. A fourth borehole, to be located away from the site, is planned. Samples from this borehole will be used to determine natural background concentrations of soil and gas. Final report preparation will begin.

*** HEADQUARTERS OFFICE *** De Kalb, Illinois

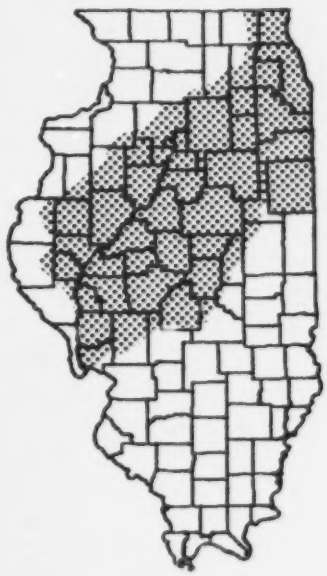
*** FIELD LOCATION *** North-Central Illinois

*** PROJECT CHIEF *** Robert G. Striegl

*** PERIOD OF PROJECT *** October 1983 to September 1986

*** PLANNED REPORTS ***
Transport of Radioactive Gases in the Unsaturated Zone at a Low-Level Radioactive-Waste Site
Journal article on Gas Transport in the Unsaturated Zone

IL064 ILLINOIS RIVER BASIN DATA



*** PROJECT TITLE *** Availability of Hydrologic, Climatologic, and Hydraulic Data in the Illinois River Basin

*** PROBLEM *** The Rock Island District of the Corps of Engineers needs pertinent hydrologic information for regulation of the Illinois Waterway. A knowledge of the available information is needed to prepare master reservoir regulation manuals.

*** OBJECTIVES *** To compile information on the source and availablity of hydrologic, climatologic, and hydraulic data for the Illinois Waterway.

*** APPROACH *** Conduct a search of the literature and query governmental agencies in order to identify and compile the source and availability of hydrologic, climatologic, and hydraulic data in the Illinois River basin. The data will be described so that the usefulness of the information can be determined.

*** SUMMARY OF RESULTS *** Eighteen governmental agencies were queried for information to identify the source and availability of climatologic, hydraulic, and hydrologic data in the Illinois River basin. The data is being compiled so that the usefulness of the information can be determined.

*** PLANS NEXT YEAR *** Provide selected hydrometeorologic information to the Corps of Engineers for incorporation into their regulation manuals for the Illinois Waterway. Prepare a report on the source and availability of climatologic, hydraulic, and hydrologic data for the Illinois River basin.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

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*** FIELD LOCATION *** Central Illinois

*** PROJECT CHIEF *** G. Wayne Curtis

*** PERIOD OF PROJECT *** October 1983 to March 1985

*** COOPERATOR ***
U.S. Army Corps of Engineers, Rock Island District

*** PLANNED REPORT ***
Availability and Source of Climatologic, Hydrologic, and Hydraulic Data in the Illinois River Basin

IL065 AQUIFER DRAINAGE NEAR STRIP MINES

*** PROJECT TITLE *** Predicting Cumulative Aquifer Drainage Flux and Drawdown Resulting from Strip-mine Excavations

*** PROBLEM *** Strip mining below the water table creates hydraulic gradients in aquifers which induce ground-water drainage toward the excavation. As the pit advances, spoil is piled in the previous cut. The resulting ground-water flow to the pit may be a layered system of two or more aquifers draining to an open face on one side and to a face adjoining spoil on the other side. Mining companies and regulatory agencies need a means for predicting the cumulative impact of strip mining on the local ground-water flow.

*** OBJECTIVES *** To simulate the magnitude of ground-water flux and position of the free water surface resulting from second and subsequent cuts using head and discharge data obtained from the first cut situation (evaluated in project IL057).

*** APPROACH *** Two-dimensional variably saturated flow will be examined using the VS2D model (Lappala, 1983) on the Illinois District's Prime computer. The project will build on the results obtained from project IL057 by simulating two cuts for various combinations of aquifer parameters and boundary conditions. Graphs or tables of drawdown versus distance and discharge versus time will be developed for various values of elapsed time of drainage to the first cut, using dimensionless variables.

*** SUMMARY OF RESULTS *** The numerical model VS2D (Lappala) has been modified to simulate ground-water drainage to surface coal mines, including effects of second and subsequent cuts. Head discharge values obtained by simulating drainage through generic aquifers, for various generic second cuts, typical of Illinois surface coal-mining regions, were nondimensionalized and presented in graphical format. The technique developed in project IL057 was written as a user's manual; development of the technique was written as an Appendix to the user's manual.

*** HEADQUARTERS OFFICE *** Urbana, Illinois

*** FIELD LOCATION *** Illinois Statewide

*** PROJECT CHIEF *** Linda S. Weiss

*** PLANNED REPORT ***
Predicting cumulative aquifer drainage flux and drawdown resulting from strip mine excavations

PUBLICATIONS

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PUBLICATIONS

Because the number of publications pertaining to water resources in Illinois is large, the publications listed below were selected to show the types of information available to those interested in or in need of water facts. Many of these publications are available for inspection at the District Office in Urbana and at large public and university libraries.

General Information

The U.S. Geological Survey announces all its publications in a monthly catalog "New Publications of the Geological Survey." Subscriptions to this monthly listing are available free upon request to the U.S. Geological Survey, 582 National Center, Reston, VA 22092. All publications are for sale unless specifically stated otherwise. Prices, which are subject to change, are not included here. Prepayment is required and information on price and availability should be obtained from listed sales offices before placing an order. The "U.S. Geological Survey Yearbook" provides a comprehensive description of the Federal Government's largest earth-science agency; copies may be purchased at the address where professional papers are sold (see below). Summaries of research in progress and results of completed investigations are published each fiscal year, beginning in 1978, in the professional paper series "Geological Survey Research." A pamphlet entitled "Geologic and Water-Supply Reports and Maps for Illinois," which includes reports on the geology of Illinois and other water-resources reports, is available free upon request to the U.S. Geological Survey, 419 National Center, Reston, VA 22092.

Additional information is given in "A Guide to obtaining information from the U.S. Geological Survey, 1982," Geological Survey Circular 777, which is free on application to Eastern Distribution Branch, Text Products Section, U.S. Geological Survey, 604 S. Pickett Street, Alexandria, VA 22304-4658.

Water-Resources Information

A monthly summary of the national water situation is presented in "National Water Conditions." It is available free on request to the U.S. Geological Survey, 419 National Center, Reston, VA 22092.

Records of streamflow, ground-water levels, and quality of water were published for many years as Geological Survey water-supply papers as explained below.

Streamflow Records

Records of daily flows of streams prior to 1971 were published in reports from the water-supply paper series "Surface-Water Supply of the United States," which were released in numbered parts as determined by natural drainage basins.

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Until 1961 this was an annual series; monthly and yearly summaries of these data were compiled in two reports: "Compilation of Records of Surface Waters of the United States through September 1950" and "Compilation of Records of Surface Waters of the United States, October 1950 to September 1960." For the period 1961-70, 5-year compilations were published. Data for Illinois are published in Parts 3, 4, and 5.

Beginning with the 1971 water year, these series were replaced by a new publication series "U.S. Geological Survey Water-Data Reports." This series combines under one cover streamflow data, water-quality data for surface and ground water, and ground-water level data for each State. For Illinois the title is "Water Resources Data for Illinois - Water Year (19XX): U.S. Geological Survey Water-Data Report IL-XX-1 and IL-XX-2" (XX represents water year published).

Quality-of-water Records

Data on quality of surface water prior to 1971 were published annually in the Water-Supply Paper series "Quality of Surface Waters of the United States," which also was released in numbered parts as determined by natural drainage basins. Data for Illinois are in Parts 3, 4, and 5.

Ground-water Records

Ground-water levels and artesian pressures in observation wells prior to 1975 were reported by geographic areas in a 5-year Water-Supply Paper series. Data for Illinois are in "Ground-Water Levels in the United States, North-Central States."

Flood Information

Methods for estimating the magnitude and frequency of floods for streams in Illinois are given in the Water-Resources Investigations 77-117, "Techniques for estimating magnitude and frequency of floods in Illinois" by G. W. Curtis, 1977.

The U.S. Geological Survey also outlines flood-prone areas on topographic maps as part of a nationwide Federal program for managing flood losses. Information on these maps is available from the District Chief, Water Resources Division, Urbana, Illinois.

USGS PROFESSIONAL PAPERS

Professional papers are sold by the Text Products Section, Eastern Distribution Branch, U.S. Geological Survey, 604 South Pickett Street, Alexandria, VA 22304.

P 218 Geology and mineral resources of the Hardin and Brussels quadrangles (in Illinois), by W. W. Rubey. 1952.

P 448-H Low-flow characteristics of streams in the Mississippi embayment in Tennessee, Kentucky, and Illinois, by P. R. Speer, W. J. Perry, J. A. McCabe, O. G. Lara, and others, with a section on Quality of the water by H. G. Jeffery. 1965.

P 492 Thermal springs of the United States and other countries of the world--A summary, by G. A. Waring. 1965.

P 813-A Summary appraisals of the Nation's ground-water resources--Ohio Region, by R. M. Bloyd, Jr. 1974.

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P 813-J Summary appraisals of the Nation's ground-water resources--Great Lakes Region, by W. G. Weist, Jr. 1977.

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USGS WATER-SUPPLY PAPERS

Water-Supply Papers are sold at the above-listed Alexandria, Va., address.

W 334 The Ohio Valley flood of March-April 1913, including comparisons with some earlier floods, by A. H. Horton and H. J. Jackson. 1913.

W 838 Floods of Ohio and Mississippi Rivers, January-February 1937, by N. C. Grover; with a section on flood deposits of the Ohio River, January-February 1937, by G. R. Mansfield. 1938.

W 1260-C Floods of 1952 in the basins of the Upper Mississippi River and Red River of the North. 1955.

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W 1370-B Floods of October 1954 in the Chicago area, Illinois and Indiana, by W. S. Daniels and M. D. Hale. 1958.

W 1473 Study and interpretation of the chemical characteristics of natural water, 2d edition, by J. D. Hem. 1970.

W 1669-O Ground-water conditions at Argonne National Laboratory, Illinois, 1948-60, by D. B. Kowles, W. J. Drescher, and E. F. LeRoux. 1963.

W 1669-S Yearly variations in runoff for the conterminous United States, 1931-60, by M. W. Busby. 1963.

W 1797 Has the United States enough water?, by A. M. Piper. 1965.

W 1800 The role of ground water in the national water situation, by C. L. McGuinness. 1963.

W 1812 Public water supplies of the 100 largest cities in the United States, 1962, by C. N. Durfor and Edith Becker. 1964.

W 1838 Reservoirs in the United States, by R. O. R. Martin and R. L. Hanson. 1966.

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W 2002 Water in urban planning, Salt Creek basin, Illinois, by A. M. Spieker. 1970.

W 2005 Model hydrographs, by W. D. Mitchell. 1972.

W 2020 Subsurface waste disposal by means of wells--A selective annotated bibliography, by D. R. Rima, E. B. Chase, and B. M. Myers. 1971.

W 2078 Some chemical characteristics of mine drainage in Illinois, by L. G. Toler. 1982.

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C 216 Water resources of the St. Louis area, Missouri and Illinois, by J. R. Searcy, R. C. Baker, and W. H. Durum. 1952.

C 456 Estimated use of water in the United States, 1960, by K. A. MacKichan and J. C. Kammerer. 1961.

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C 554 Hydrology for urban land planning--A guidebook on the hydrologic effects of urban land use, by L. B. Leopold. 1968.

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C 601-C Flood hazard mapping in metropolitan Chicago, by J. R. Sheaffer, D. W. Ellis, and A. M. Spieker. 1970.

C 601-D Water as an urban resource and nuisance, by H. E. Thomas and W. J. Schneider. 1970.

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Hydrologic Investigations Atlases and other maps of areas east of the Mississippi River are sold by the Eastern Distribution Branch, U.S. Geological Survey, 1200 South Eads Street, Arlington, VA 22202; maps and Atlases of areas west of the Mississippi River are sold by the Western Distribution Branch, U.S. Geological Survey, Box 25286, Federal Center, Denver, CO 80225.

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HA-61. Stream composition of the conterminous United States, by F. H. Rainwater. 1962.

HA-67. Floods in Arlington Heights quadrangle, [northeastern] Illinois, by D. W. Ellis, H. E. Allen, and A. W. Noehre. 1963.

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HA-194. Generalized map showing annual runoff and productive aquifers in the conterminous United States, compiled by C. L. McGuinness. 1964.

HA-199. Preliminary map of the conterminous United States showing depth to and quality of shallowest ground water containing more than 1,000 parts per million dissolved solids, by J. H. Feth and others. 1965.

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HA-212. Annual runoff in the conterminous United States, by M. W. Busby. 1966.

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HA-251. Floods in Peotone quadrangle, northeastern Illinois, by H. E. Allen. 1967.

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HA-282. River discharge to the sea from the shores of the conterminous United States--A contribution to the International Hydrological Decade, compiled by Alfonso Wilson and K. T. Iseri. 1967.

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HA-362. Floods in Channahon quadrangle, northeastern Illinois, by H. E. Allen and A. W. Noehre, 1971.

HA-363. Floods in Hebron quadrangle, northeastern Illinois, by H. E. Allen and R. S. Grant. 1971.

HA-449. Floods on Loop Creek and Richland Creek, near Belleville, [southwestern] Illinois, by J. D. Camp. 1972.

HA-458. Floods in Maple Park quadrangle, northeastern Illinois, by R. T. Mycyk and G. L. Walter. 1972.

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HA-463. Floods in Marengo South quadrangle, northeastern Illinois, by H. E. Allen. 1972.

HA-464. Floods in Riley quadrangle, northeastern Illinois, by R. T. Mycyk and R. S. Grant. 1972.

HA-472. Floods in Big Rock quadrangle, northeastern Illinois, by R. T. Mycyk G. L. Walter, and B. L. McDonald. 1973.

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HA-498. Floods in Capron quadrangle, northeastern Illinois, by R. S. Grant and M. D. Duerk. 1973.

USGS HYDROLOGIC UNIT MAPS

Hydrologic Unit Maps and other maps of areas east of the Mississippi River are sold by the Eastern Distribution Branch, U.S. Geological Survey, 1200 South Eads Street, Arlington, VA 22202; maps west of the Mississippi River are sold by the Western Distribution Branch, U.S. Geological Survey, Box 25286, Federal Center, Denver, CO 80225.

U.S. Geological Survey, 1975, Hydrologic unit map of Illinois--1974.

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The following reports are available for inspection at the Illinois and Reston, Va., offices of the U.S. Geological Survey. The reports may be purchased either as microfiche or hard copy from the National Technical Information Service (NTIS), U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161; the NTIS ordering number is given in parentheses at the end of the citation. Further information about these reports may be obtained from the District Chief, WRD, Urbana.

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WRI 82-13. Time of concentration and storage coefficient values for Illinois streams, by J. B. Graf, G. Garklavs, and K. A. Oberg, 1982. (PB82 219320)

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The following reports are available for inspection in the Urbana, Ill., and Reston, Va., offices of the U.S. Geological Survey. They may be purchased from the Open-File Services Section (OFSS), Western Distribution Branch, U.S. Geological Survey, Box 25425, Federal Center, Denver, CO 80225.

82-4047. Hydrologic effects of storing liquified sewage sludge on strip-mine land, Fulton County, Illinois, by G. L. Patterson, 1982.

82-4073. Runoff, sediment transport, and water quality in a northern Illinois agricultural watershed before urban development, 1979-81, by H. E. Allen, Jr. and John R. Gray, 1984.

83-4048. Water in sand and gravel deposits in McHenry County, Illinois, by J. R. Nicholas and J. T. Krohelski, 1984.

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82-693. Work Plan for the Sangamon River basin, Illinois, by J. K. Stamer and D. M. Mades, 1983.

82-1001. Proceedings--Illinois Water-Data-Users Meeting, Peoria, Illinois, February 23-24, 1982, by L. G. Toler, 1982.

83-213. Floods of December 1982 and January 1983 in central and southern Mississippi River basin, by V. B. Sauer and J. M. Fulford, 1983.

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The following reports are available from the District Office, 4th Floor, 102 East Main Street, Urbana, IL 61801:

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81-403. Hydrology of Area 35, Eastern Region, Interior Coal Province, Illinois and Kentucky, by E. E. Zuehls, G. L. Ryan, D. B. Peart, and K. K. Fitzgerald, 1981.

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77-867. Sediment transport to the Fox Chain of Lakes, Illinois, by T. P. Brabets.

79-210. Water-table contour map of land reclamation site, Fulton County, Illinois, by R. F. Fuentes and G. L. Patterson.

WATER-DATA REPORTS

The water-data reports listed below may be purchased as hard copy or microfiche from the National Technical Information Service (NTIS), U.S. Department of Commerce, Springfield, VA 22161. They are available for inspection only at the Illinois and Reston, Va., offices of the U.S. Geological Survey. The PB number in parentheses is the NTIS ordering number.

IL-71-1. Water Resources Data for Illinois--Water Year 1971, by U.S. Geological Survey, 1972. (PB 288019/AS)

IL-72-1. Water Resources Data for Illinois--Water Year 1972, by U.S. Geological Survey, 1973. (PB 288018/AS)

IL-73-1. Water Resources Data for Illinois--Water Year 1973, by U.S. Geological Survey, 1974. (PB 288020/AS)

IL-74-1. Water Resources Data for Illinois--Water Year 1974, by U.S. Geological Survey, 1975. (PB 288021/AS)

IL-75-1. Water Resources Data for Illinois--Water Year 1975, by U.S. Geological Survey, 1976. (PB 254434/AS)

IL-76-1. Water Resources Data for Illinois--Water Year 1976, by U.S. Geological Survey, 1977. (PB 266379/AS)

IL-77-1. Water Resources Data for Illinois--Water Year 1977, by U.S. Geological Survey, 1978. (PB 283562/AS)

IL-78-1. Water Resources Data for Illinois--Water Year 1978, Volume 1, Illinois except Illinois River basin, by U.S. Geological Survey, 1979. (PB 296416/AS)

IL-78-2. Water Resources Data for Illinois--Water Year 1978, Volume 2, Illinois River basin, by U.S. Geological Survey, 1979. (PB 296417/AS)

IL-79-1. Water Resources Data for Illinois--Water Year 1979, Volume 1, Illinois except Illinois River basin, by U.S. Geological Survey, 1980. (PB80-207004)

IL-79-2. Water Resources Data for Illinois--Water Year 1979, Volume 2, Illinois River basin, by U.S. Geological Survey, 1980. (PB80-205230).

IL-80-1. Water Resources Data for Illinois--Water Year 1980, Volume 1, Illinois except Illinois River basin, by U.S. Geological Survey, 1981. (PB82-106311)

IL-80-2. Water Resources Data for Illinois--Water Year 1980, Volume 2, Illinois River basin, by U.S. Geological Survey, 1981. (PB82-106220)

IL-81-1. Water Resources Data - Illinois--Water Year 1981, Volume 1, Illinois except Illinois River basin, by U.S. Geological Survey, 1982. (PB83 119966)

IL-81-2. Water Resources Data - Illinois--Water Year 1981, Volume 2, Illinois River basin, by U.S. Geological Survey, 1982. (PB83 119974)

IL-82-1. Water Resources Data - Illinois--Water Year 1982, Volume 1, Illinois except Illinois River basin, by R. L. Stahl, K. K. Fitzgerald, T. E. Richards, and P. D. Hayes, 1983. (PB84-120112)

IL 82-2. Water Resources Data - Illinois--Water Year 1982, Volume 2, Illinois River basin, by T. E. Richards, P. D. Hayes, R. L. Stahl, and K. K. Fitzgerald, 1983. (PB84-120120)

IL 83-1. Water Resources Data - Illinois--Water Year 1983, Volume 1, Illinois except Illinois River basin, by R. L. Stahl, K. K. Fitzgerald, T. E. Richards, and P. D. hayes, 1984.

IL 83-2. Water Resources Data - Illinois--Water Year 1983, Volume 2, Illinois River basin, by K. K. Fitzgerald, P. D. Hayes, T. E. Richards, and R. L. Stahl, 1984.

MISCELLANEOUS PUBLICATIONS

Preliminary results of a study of the unsaturated zone at the low-level radioactive waste disposal site near Sheffield, Illinois, by R. W. Healy, published in the proceedings of the Fifth Annual Participants' Information Meeting, DOE low-level waste management program, August 30-September 1, 1983, Denver, Colorado, p. 669-673.

Accumulation of sediment and heavy metals in Lake Ellyn, an urban lake at Glen Ellyn, Illinois, by Ellan A. Cowan, published in the proceedings of the conference on urban effects on water quality and quantity, October 20-21, 1983, Urbana, Illinois, Illinois Department of Energy and Natural Resources Document No. 84/06, p. 280-292.

Effects of an urban lake on stormwater runoff and quality, by Robert G. Striegl, published in the proceedings of the conference on urban effects on water quality and quantity, October 20-21, 1983, Urbana, Illinois, Illinois Department of Energy and Natural Resources Document No. 84/06, p. 74-83.

Study of the unsaturated zone at a low-level radioactive waste disposal site, by R. W. Healy, C. A. Peters, M. P. deVries, P. C. Mills, and D. L. Moffett, published in the proceedings of the conference on characterization of the vadose (unsaturated) zone, National Water Well Association, Dec. 8-10, 1983, Las Vegas, Nevada, p. 820-830.

Predicting ground-water drainage to surface mines, by Linda S. Weiss and Devin L. Galloway, published in the proceedings of the conference on water for resource development, ASCE Hydraulics Division Speciality Conference, Aug. 14-17, 1984, Coeur d'Alene, Idaho, p. 184-188.

Runoff, sediment transport, and landform modifications near Sheffield, Illinois, by J. R. Gray, published in the proceedings of the Sixth Annual Participants' Information Meeting, DOE low-level waste management program, September 11-13, 1984, Denver, Colorado, p. 579-587.

Methods for determining the transport of radioactive gases in the unsaturated zone, by R. G. Striegl, published in the proceedings of the Sixth Annual Participants' Information Meeting, DOE low-level waste management program, September 11-13, 1984, Denver, Colorado, p. 534-544.

Hydrogeology of a low-level radioactive-waste disposal site near Sheffield, Illinois, by J. R. Erickson, published in the program of the North-Central Section, Geological Society of America, 14th annual meeting, April 10-11, 1980, at Bloomington, Indiana, p. 225.

Anisotropic ground-water movement and tritium migration in glacial drift beneath a low-level radioactive waste burial site, Argonne, Illinois, by J. C. Olimpio, published in the program of the North-Central Section, Geological Society of America, 14th annual meeting, April 10-11, 1980, Bloomington, Indiana, p. 253.

Runoff characteristics from strip-mined lands in Illinois, by T. P. Brabets, published in the proceedings of the Midwest AGU meeting, September 18-19, 1980, De Kalb, Illinois, p. 12.

Estimating average velocities for selected reaches of Illinois streams, by J. B. Graf, published in EOS, Transactions, American Geophysical Union, Vol. 63, No. 18, May 4, 1982, p. 325.

Hydrogeologic controls on the extent and rate of tritium migration from a low-level radioactive waste disposal facility near Sheffield, Illinois, by J. B. Foster, R. W. Healy, K. Cartwright, and T. M. Johnson, published in the program of the North-Central Section, Geological Society of America, 17th annual meeting, April 28-29, 1983, Madison, Wisconsin.

Infiltration through trench caps at a low-level radioactive waste disposal site, by R. W. Healy, published in the proceedings of the National Conference on Advances in Infiltration, Dec. 12-13, 1983, Chicago, Illinois, American Society of Agricultural Engineers Publication 11-83, p. 376.

WHERE TO OBTAIN ADDITIONAL INFORMATION ON U.S. GEOLOGICAL SURVEY PROGRAMS IN ILLINOIS

WATER

District Chief
U.S. Geological Survey
4th floor
102 East Main Street
Urbana, Illinois 61801

Phone: (217) 398-5353

MAPS

Chief
Mid-Continent Mapping Center
U.S. Geological Survey
Building 1400, Stop 300
1400 Independence Road
Rolla, Missouri 65401

Phone: (314) 364-3680

GEOLOGY

Assistant Chief Geologist, Eastern Region
U.S. Geological Survey
953 National Center
Reston, Virginia 22092

GENERAL INFORMATION

Assistant Director, Eastern Region
U.S. Geological Survey
109 National Center
Reston, Virginia 22092

Phone: (703) 860-7414

OR

Public Inquiries Office
U.S. Geological Survey
302 National Center
Reston, Virginia 22092

Phone: (703) 860-6167

REFERENCES

Illinois Environmental Protection Agency, 1984, Illinois water quality report: State of Illinois, Environmental Protection Agency, Division of Water Pollution Control, Monitoring Unit, 171 p.

Illinois Pollution Control Board, 1984, Rules and regulations, Title 35: Environmental protection, Subtitle C: Water pollution, Chapter I: Springfield, 44 p.

Josefson, B. M., and Blackwell, C. D., 1982, Directory of assistance centers of the National Water Data Exchange (NAWDEX): U.S. Geological Survey Open-File Report 82-925, 31 p.

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TABLES 2 and 3

BEST COPY AVAILABLE

Table 2.--Surface-Water Stations

Abbreviations for types of data collected are:

C - Crest stage - peak-stage and peak-discharge record only.
CQ - Chemical quality.
D - Discharge - continuous record of stage and discharge.
DS - Discharge with auxiliary slope gage - continuous record of stage and discharge.
R - Lake contents - furnished by U.S. Army Engineers, St. Louis District.
S - Stage - continuous record of stage.
SD - Suspended sediment.

Station No.	Station	Type of data
03336645	Middle Fork Vermilion River above Oakwood, Ill.	CQ,D
03336900	Salt Fork near St. Joseph, Ill.	D,CQ
03337000	Boneyard Creek at Urbana, Ill.	D
03337700	Saline Branch near Mayview, Ill.	CQ
03338097	Salt Fork near Oakwood, Ill.	CQ
03338780	North Fork Vermilion River near Bismarck, Ill.	CQ
03339000	Vermilion River near Danville, Ill.	D,CQ
03339147	Little Vermilion River near Georgetown, Ill.	CQ
03341414	Brouilletts Creek near St. Bernice, Ind.	CQ
03341540	Sugar Creek near Elbridge, Ill.	CQ
03341920	Wabash River at Hutsonville, Ill.	CQ
03342050	Sugar Creek at Palestine, Ill.	CQ
03343395	Embarras River at Camargo, Ill.	CQ
03343400	Embarras River near Camargo, Ill.	D
03344000	Embarras River near Diona, Ill.	CQ,C
03344500	Range Creek near Casey, Ill.	C
03345500	Embarras River at Ste. Marie, Ill.	D,CQ
03346000	North Fork Embarras River near Oblong, Ill.	D,CQ
03346550	Embarras River near Billett, Ill.	CQ
03378000	Bonpas Creek at Browns, Ill.	D,CQ
03378635	Little Wabash River near Effingham, Ill.	D,CQ
03378900	Little Wabash River at Louisville, Ill.	CQ,C
03379500	Little Wabash River below Clay City, Ill.	D,CQ
03379600	Little Wabash River at Blood, Ill.	CQ
03379950	Elm River near Toms Prairie, Ill.	CQ
03380350	Skillet Fork near Iuka, Ill.	CQ
03380475	Horse Creek near Keenes, Ill.	D
03380500	Skillet Fork at Wayne City, Ill.	D,CQ
03381400	Skillet Fork near Carmi, Ill.	CQ
03381495	Little Wabash River at Main St. at Carmi, Ill.	CQ

Table 2.--Surface-Water Stations--Continued

Station No.	Station	Type of data
03381500	Little Wabash River at Carmi, Ill.	DS
03382090	Sugar Creek near Stonefort, Ill.	CQ
03382100	South Fork Saline River nr Carrier Mills, Ill.	D,CQ
03382185	Bankston Fork near Dorris Heights, Ill.	CQ
03382205	Middle Fork Saline River near Pankeyville, Ill.	CQ
03382325	North Fork Saline River near Texas City, Ill.	CQ
03382530	Saline River near Gibsonia, Ill.	CQ
03384450	Lusk Creek near Eddyville, Ill.	D,CQ
03385000	Hayes Creek at Glendale, Ill.	C
03612000	Cache River at Forman, Ill.	D,CQ
05414820	Sinsinawa River near Menominee, Ill.	D
05416000	Galena River at Galena, Ill.	CQ
05418950	Apple River near Elizabeth, Ill.	CQ
05419000	Apple River near Hanover, Ill.	D
05420100	Plum River at Savanna, Ill.	CQ
05435500	Pecatonica River at Freeport, Ill.	D,CQ
05435680	Yellow Creek near Freeport, Ill.	CQ
05435800	Pecatonica River at Harrison, Ill.	CQ
05437500	Rock River at Rockton, Ill.	D,CQ
05437695	Keith Creek at Eighth St. at Rockford, Ill.	D
05438201	Kishwaukee R at GP Rd at Garden Prairie, Ill.	CQ
05438250	Coon Creek at Riley, Ill.	CQ,C
05438500	Kishwaukee River at Belvidere, Ill.	D
05438600	Kishwaukee R ab South Branch nr Perryville, Ill.	CQ
05439000	South Branch Kishwaukee River at De Kalb, Ill.	D
05439500	South Branch Kishwaukee River nr Fairdale, Ill.	D,CQ
05440000	Kishwaukee River near Perryville, Ill.	D,CQ
05440520	Killbuck Creek near New Milford, Ill.	CQ
05440700	Rock River at Byron, Ill.	CQ
05442020	Kyte River at Daysville, Ill.	CQ
05442200	Rock River at Grand Detour, Ill.	CQ
05443500	Rock River at Como, Ill.	D,CQ
05444000	Elkhorn Creek near Penrose, Ill.	D,CQ
05446000	Rock Creek at Morrison, Ill.	D
05446100	Rock Creek near Erie, Ill.	CQ
05446500	Rock River near Joslin, Ill.	D,CQ
05447100	Green River near Deer Grove, Ill.	CQ
05447500	Green River near Geneseo, Ill.	D,CQ
05448000	Mill Creek at Milan, Ill.	D
05466000	Edwards River near Orion, Ill.	D

Table 2.--Surface-Water Stations--Continued

Station No.	Station	Type of data
05466500	Edwards River near New Boston, Ill.	D,CQ
05467000	Pope Creek near Keithsburg, Ill.	D
05468500	Cedar Creek at Little York, Ill.	C
05469000	Henderson Creek near Oquawka, Ill.	D,CQ
05495500	Bear Creek near Marcelline, Ill.	D,CQ
05502020	Hadley Creek near Barry, Ill.	C
05502040	Hadley Creek at Kinderhook, Ill.	D
05512500	Bay Creek at Pittsfield, Ill.	D
05513000	Bay Creek at Nebo, Ill.	D,CQ
05520500	Kankakee River at Momence, Ill.	D,CQ
05525000	Iroquois River at Iroquois, Ill.	D,CQ
05525500	Sugar Creek at Milford, Ill.	D,CQ
05526000	Iroquois River near Chebanse, Ill.	D,CQ
05527500	Kankakee River near Wilmington, Ill.	D,CQ
05527800	Des Plaines River at Russell, Ill.	D,CQ
05528000	Des Plaines River near Gurnee, Ill.	D,CQ
05528500	Buffalo Creek near Wheeling, Ill.	D
05529000	Des Plaines River near Des Plaines, Ill.	D,CQ
05529500	McDonald Creek near Mount Prospect, Ill.	D
05530000	Weller Creek at Des Plaines, Ill.	D
05530590	Des Plaines River near Schiller Park, Ill.	CQ
05530990	Salt Creek at Rolling Meadows, Ill.	D
05531500	Salt Creek at Western Springs, Ill.	D,CQ
05532000	Addison Creek at Bellwood, Ill.	D,CQ
05532500	Des Plaines River at Riverside, Ill.	D
05533000	Flag Creek near Willow Springs, Ill.	D
05534050	Des Plaines River at Lockport, Ill.	CQ
05534500	North Branch Chicago River at Deerfield, Ill.	D,CQ
05535000	Skokie River at Lake Forest, Ill.	D
05535070	Skokie River near Highland Park, Ill.	D
05535500	West Fk of N Br Chicago River at Northbrook, Ill.	D
05536000	North Branch Chicago River at Niles, Ill.	D,CQ,SD[1]
05536195	Little Calumet River at Munster, Ind.	CQ
05536215	Thorn Creek at Glenwood, Ill.	D
05536235	Deer Creek near Chicago Heights, Ill.	D

[1] Planned new activity in 1985 water year.

Table 2.--Surface-Water Stations--Continued

Station No.	Station	Type of data
05536255	Butterfield Creek at Flossmoor, Ill.	D
05536265	Lansing ditch near Lansing, Ill.	D
05536275	Thorn Creek at Thornton, Ill.	D,CQ
05536290	Little Calumet River at South Holland, Ill.	D
05536340	Midlothian Creek at Oak Forest, Ill.	D
05536500	Tinley Creek near Palos Park, Ill.	D
05536700	Calumet Sag Channel at Sag Bridge, Ill.	CQ
05536995	Chicago Sanitary & Ship Canal at Romeoville, Ill.	D
05537000	Chicago Sanitary and Ship Canal at Lockport, Ill.	CQ
05537500	Long Run near Lemont, Ill.	D
05537980	Des Plaines River at Route 53 at Joliet, Ill.	CQ
05539000	Hickory Creek at Joliet, Ill.	D,CQ
05539900	West Branch Du Page River nr West Chicago, Ill.	D,CQ
05540095	West Branch Du Page River nr Warrenville, Ill.	D,CQ
05540210	East Branch Du Page River at Rt 34 at Lisle, Ill.	CQ
05540290	Du Page River near Naperville, Ill.	CQ
05540500	Du Page River at Shorewood, Ill.	D,CQ
05541710	Aux Sable Creek near Morris, Ill.	CQ
05542000	Mazon River near Coal City, Ill.	D,CQ
05543500	Illinois River at Marseilles, Ill.	D,CQ
05546700	Fox River near Channel Lake, Ill.	CQ
05547000	Channel Lake near Antioch, Ill.	S
05547500	Fox Lake near Lake Villa, Ill.	S
05548000	Nippersink Lake at Fox Lake, Ill.	S
05548280	Nippersink Creek near Spring Grove, Ill.	D,CQ
05548500	Fox River at Johnsburg, Ill.	S
05549000	Boone Creek near McHenry, Ill.	C
05549500	Fox River near McHenry, Ill.	S
05549600	Fox River at Burtons Bridge, Ill.	CQ
05550000	Fox River at Algonquin, Ill.	D,CQ
05550500	Poplar Creek at Elgin, Ill.	D,CQ
05551000	Fox River at South Elgin, Ill.	CQ
05551200	Ferson Creek near St. Charles, Ill.	D
05551540	Fox River at Montgomery, Ill.	CQ
05551700	Blackberry Creek near Yorkville, Ill.	D,CQ
05551995	Somonauk Creek at Sheridan, Ill.	CQ
05552500	Fox River at Dayton, Ill.	D,CQ
05554000	North Fork Vermilion River near Charlotte, Ill.	C
05554490	Vermilion River at McDowell, Ill.	CQ
05554500	Vermilion River at Pontiac, Ill.	D

Table 2.--Surface-Water Stations--Continued

Station No.	Station	Type of data
05555300	Vermilion River near Leonore, Ill.	D,CQ
05555950	Little Vermilion River at La Salle, Ill.	CQ
05556200	Illinois River at Hennepin, Ill.	CQ
05556500	Big Bureau Creek at Princeton, Ill.	D,CQ
05557000	West Bureau Creek at Wyanet, Ill.	C,CQ
05557500	East Bureau Creek near Bureau, Ill.	C
05558900	Illinois River at Henry, Ill.	DS,SD
05558995	Illinois River at Lacon, Ill.	CQ
05559900	Illinois River at Water Company at Peoria, Ill.	CQ
05560500	Farm Creek at Farmdale, Ill.	D
05561500	Fondulac Creek near East Peoria, Ill.	D
05562010	Farm Creek at Camp St Bridge at East Peoria, Ill.	CQ
05563000	Kickapoo Creek near Kickapoo, Ill.	C
05563500	Kickapoo Creek at Peoria, Ill.	C
05563525	Kickapoo Creek at Bartonville, Ill.	CQ
05563800	Illinois River at Pekin, Ill.	CQ
05567000	Panther Creek near El Paso, Ill.	C
05567500	Mackinaw River near Congerville, Ill.	D
05567510	Mackinaw River below Congerville, Ill.	CQ,SD
05568000	Mackinaw River near Green Valley, Ill.	C
05568005	Mackinaw River below Green Valley, Ill.	CQ
05568500	Illinois River at Kingston Mines, Ill.	DS
05568775	Spoon River near Wyoming, Ill.	CQ
05568800	Indian Creek near Wyoming, Ill.	D,CQ
05568915	Spoon River near Dahinda, Ill.	CQ
05569500	Spoon River at London Mills, Ill.	D,CQ
05570000	Spoon River at Seville, Ill.	D,CQ
05570350	Big Creek at St. David, Ill.	D,CQ
05570360	Evelyn Branch near Bryant, Ill.	D,CQ
05570370	Big Creek near Bryant, Ill.	D,SD,CQ
05570380	Slug Run near Bryant, Ill.	CQ,D
[2]05570500	Illinois River at Havana, Ill.	DS
05570520	Illinois River at Power Company at Havana, Ill.	CQ
05570910	Sangamon River at Fisher, Ill.	D,CQ
05572000	Sangamon River at Monticello, Ill.	D

[2] Planned new station in 1985 water year.

Table 2.--Surface-Water Stations--Continued

Station No.	Station	Type of data
05572125	Sangamon R at Allerton Park nr Monticello, Ill.	CQ
05573504	Sangamon R at L Decatur W I at Decatur, Ill.	CQ
05573540	Sangamon River at Route 48 at Decatur, Ill.	CQ,D
05573650	Sangamon River near Niantic, Ill.	CQ
05573800	Sangamon River at Roby, Ill.	CQ
05574500	Flat Branch near Taylorville, Ill.	CQ
05575500	South Fork Sangamon River at Kincaid, Ill.	C,CQ
05575570	Sangchris Lake near New City, Ill.	CQ
05575800	Horse Creek at Pawnee, Ill.	D
05576000	South Fork Sangamon River near Rochester, Ill.	DS
05576022	South Fork Sangamon River below Rochester, Ill.	CQ
05576250	Sugar Creek near Springfield, Ill.	CQ
05576500	Sangamon River at Riverton, Ill.	C,CQ
05577500	Spring Creek at Springfield, Ill.	D
05577505	Spring C at Burns Lane Br at Springfield, Ill.	CQ
05578000	Sangamon River at Petersburg, Ill.	CQ
05578500	Salt Creek near Rowell, Ill.	D,CQ
05579500	Lake Fork near Cornland, Ill.	D,CQ
05580000	Kickapoo Creek at Waynesville, Ill.	D,CQ
05580500	Kickapoo Creek near Lincoln, Ill.	C,CQ
05580950	Sugar Creek near Bloomington, Ill.	D
05581500	Sugar Creek near Hartsburg, Ill.	C,CQ
05582000	Salt Creek near Greenview, Ill.	D,CQ
05583000	Sangamon River near Oakford, Ill.	D,CQ,SD
05583915	Sugar Creek near Frederick, Ill.	CQ
05584400	Drowning Fork at Bushnell, Ill.	C
05584500	La Moine River at Colmar, Ill.	D,CQ
05585000	La Moine River at Ripley, Ill.	D,CQ
05585275	Indian Creek at Arenzville, Ill.	CQ
05585500	Illinois River at Meredosia, Ill.	DS
05585830	McKee Creek at Chambersburg, Ill.	CQ
05586000	N Fk Mauvaise Terre Ck near Jacksonville, Ill.	C
05586040	Mauvaise Terre Creek near Merritt, Ill.	CQ
05586100	Illinois River at Valley City, Ill.	CQ,SD
05586500	Hurricane Creek near Roodhouse, Ill.	C
05586600	Apple Creek near Eldred, Ill.	CQ
05586690	Macoupin Creek near Macoupin, Ill.	CQ
05587000	Macoupin Creek near Kane, Ill.	D,CQ
05587060	Illinois River at Hardin, Ill.	CQ
05587700	Wood River at East Alton, Ill.	CQ

Table 2.--Surface-Water Stations--Continued

Station No.	Station	Type of data
05587900	Cahokia Creek at Edwardsville, Ill.	D,CQ
05588000	Indian Creek at Wanda, Ill.	D
05589490	Cahokia Canal near Collinsville, Ill.	CQ
05589500	Canteen Creek at Caseyville, Ill.	C
05589510	Canteen Creek near Collinsville, Ill.	CQ
05589785	Harding Ditch at East St. Louis, Ill.	CQ
05590000	Kaskaskia Ditch at Bondville, Ill.	D
05590420	Kaskaskia River near Tuscola, Ill.	CQ
05590800	Lake Fork at Atwood, Ill.	D
05591200	Kaskaskia River at Cooks Mills, Ill.	D,CQ,SD,S
05591300	Kaskaskia River at Allenville, Ill.	CQ
05591400	Jonathan Creek near Sullivan, Ill.	CQ
05591500	Asa Creek at Sullivan, Ill.	CQ
05591550	Whitley Creek near Allenville, Ill.	D,S
05591700	West Okaw River near Lovington, Ill.	CQ,D,S
05591950	Lake Shelbyville near Shelbyville, Ill.	R
05592000	Kaskaskia River at Shelbyville, Ill.	D,CQ
05592050	Robinson Creek near Shelbyville, Ill.	D,S
05592100	Kaskaskia River near Cowden, Ill.	D,CQ,S
05592195	Beck Creek at Herrick, Ill.	CQ
05592500	Kaskaskia River at Vandalia, Ill.	D,CQ,S
05592600	Hickory Creek near Bluff City, Ill.	CQ,S
05592800	Hurricane Creek near Mulberry Grove, Ill.	D,CQ,S
05592900	East Fork Kaskaskia River near Sandoval, Ill.	CQ,D,S
05592930	North Fork Kaskaskia River near Patoka, Ill.	CQ
05592990	Carlyle Lake near Carlyle, Ill.	R
05593000	Kaskaskia River at Carlyle, Ill.	D,S
05593010	Kaskaskia River below Carlyle, Ill.	CQ
[2]05593020	Kaskaskia River near Posey, Ill.	S
05593505	Crooked Creek enar Odin, Ill.	CQ
05593520	Crooked Creek near Hoffman, Ill.	D,CQ
05593575	Little Crooked Creek near New Minden, Ill.	D
05593600	Blue Grass Creek near Raymond, Ill.	C
05593785	Shoal Creek near Walshville, Ill.	CQ
05593900	East Fork Shoal Creek near Coffeen, Ill.	D

[2] Planned new station in 1985 water year.

Table 2.--Surface-Water Stations--Continued

Station No.	Station	Type of data
05594000	Shoal Creek near Breese, Ill.	D,CQ,S
05594090	Sugar Creek at Albers, Ill.	CQ
05594100	Kaskaskia River near Venedy Station, Ill.	D,CQ,SD,S
05594450	Silver Creek near Troy, Ill.	D,CQ
05594800	Silver Creek near Freeburg, Ill.	D,CQ,S
05595200	Richland Creek near Hecker, Ill.	D,CQ,S
05595280	Plum Creek near Baldwin, Ill.	CQ
05595400	Kaskaskia River at Roots, Ill.	CQ
05595540	Marys River at Welge, Ill.	CQ
05595700	Big Muddy River near Mt. Vernon, Ill.	CQ,S
05595730	Rayse Creek near Waltonville, Ill.	CQ,D,S
05595765	Big Muddy Subimpoundment at Rend Lake, Ill.	S
05595830	Casey Fork at Rt 37 near Mt. Vernon, Ill.	CQ,S
05595860	Casey Fork Subimpoundment at Rend Lake, Ill.	S
05595950	Rend Lake near Benton, Ill.	R,CQ
05596400	Middle Fork Big Muddy River near Benton, Ill.	CQ
05597000	Big Muddy River at Plumfield, Ill.	DS,CQ
05597040	Pond Creek at West Frankfort, Ill.	CQ
05597280	Little Muddy River near Elkville, Ill.	CQ
05597500	Crab Orchard Creek near Marion, Ill.	D,CQ
05598050	Crab Orchard C below CO Lake nr Carterville, Ill.	CQ
05598245	Crab Orchard Creek near Carbondale, Ill.	CQ
05599200	Beaucoup Creek near Vergennes, Ill.	CQ
05599500	Big Muddy River at Murphysboro, Ill.	DS,CQ,SD
05599540	Kinkaid Creek near Murphysboro, Ill.	CQ
05599565	Cedar Creek near Pomona, Ill.	CQ
05600000	Big Creek near Wetaug, Ill.	C
05600150	Cache River at Sandusky, Ill.	CQ

Table 3.--Ground-Water Stations

Abbreviations for type of data collected are:

L - Ground-water level measurement.
Q - Ground-water quality determination.
M - Description of subsurface material.
B - Well characteristics.

Abbreviations for ownership are:

ANL - Argonne National Laboratory
USGS - U.S. Geological Survey

Station No.	Local Well No.	Ownership	Type of data
	ADAMS COUNTY		
400026091242401	Clayton-Camp Point #1	Municipal	L,Q,M,B
	ALEXANDER COUNTY		
371010089203701	Central Alexander Co. WD #1	Municipal	L,Q,M,B
371909089255801	McClure-East Cape PWD #1	Municipal	L,Q,M,B
	BOONE COUNTY		
421649088513801	Belvidere #9	Municipal	L,Q,M,B
	BUREAU COUNTY		
412014089472001	604	USGS	L
412015089472201	568	USGS	L
412016089472301	525	USGS	L
412017089472201	567	USGS	L
412017089472401	512	USGS	L
412017089472701	524	USGS	L
412017089472901	552	USGS	L
412017089472902	559	USGS	L
412017089473101	529	USGS	L
412017089473102	549	USGS	L
412017089473201	510	USGS	L
412017089473401	530	USGS	L
412017089473701	531	USGS	L
412018089471601	566	USGS	L
412018089472101	506	USGS	L
412018089472301	526	USGS	L
412018089472501	542	USGS	L
412018089472601	527	USGS	L
412018089473101	546	USGS	L
412018089473801	532	USGS	L

Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	BUREAU COUNTY--Continued		
412019089470801	606	USGS	L
412019089471801	611	USGS	L
412019089472501	505	USGS	L
412019089472701	523	USGS	L
412019089472801	540	USGS	L
412019089472802	541	USGS	L
412019089472901	507	USGS	L
412019089472902	528	USGS	L
412019089473301	509	USGS	L
412020089471901	602	USGS	L
412020089472301	504	USGS	L
412020089473601	522	USGS	L
412020089473602	551	USGS	L
412020089473701	548	USGS	L
412021089470901	605	USGS	L
412021089471301	562	USGS	L
412021089471601	610	USGS	L
412021089471901	609	USGS	L
412021089472901	508	USGS	L
412021089473102	543	USGS	L
412021089473901	511	USGS	L,Q
412022089471301	561	USGS	L
412022089471701	608	USGS	L
412022089472301	501	USGS	L
412022089472401	502	USGS	L
412022089472501	537	USGS	L
412022089472502	588	USGS	L
412022089473301	538	USGS	L
412022089473302	539	USGS	L
412023089470401	574	USGS	L
412023089470901	573	USGS	L
412023089472201	582	USGS	L
412023089472301	565	USGS	L
412023089473201	544	USGS	L
412023089473202	545	USGS	L
412024089472101	579	USGS	L
412024089472301	563	USGS	L,Q
412024089472302	578	USGS	L
412024089472501	577	USGS	L
412024089472502	587	USGS	L

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Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	BUREAU COUNTY--Continued		
412024089472601	586	USGS	L
412024089473301	520	USGS	L
412024089473601	553	USGS	L
412024089473801	519	USGS	L
412025089471201	572	USGS	L
412025089471701	599	USGS	L
412025089471901	592	USGS	L
412025089472101	575	USGS	L
412025089472102	581	USGS	L
412025089472201	576	USGS	L
412025089472301	583	USGS	L
412025089472701	536	USGS	L
412025089472801	550	USGS	L
412025089472802	534	USGS	L
412025089472901	535	USGS	L,Q
412025089473601	533	USGS	L,Q
412026089471201	571	USGS	L
412026089471701	560	USGS	L
412026089471702	597	USGS	L
412026089471703	600	USGS	L
412026089471704	601	USGS	L
412026089471901	591	USGS	L
412026089472001	594	USGS	L
412026089472501	547	USGS	L
412026089472701	555	USGS	L
412026089472702	556	USGS	L
412026089472703	557	USGS	L
412026089472801	554	USGS	L
412027089472501	518	USGS	L
412027089472701	517	USGS	L
412027089472901	516	USGS	L,Q
412027089473201	514	USGS	L,Q
412027089473401	515	USGS	L
412027089473701	513	USGS	L
412028089472301	564	USGS	L
412030089472001	570	USGS	L
412032089472201	569	USGS	L
412220089280301	-	Helen Croisant	L
412232089275101	Princeton #5	Municipal	L,Q,M,B

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Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	CASS COUNTY		
400025090244401	Beardstown #13	Municipal	L,Q,M,B
	CARROLL COUNTY		
415737090061001	Thomson #4	Municipal	L,Q,M,B
	CHAMPAIGN COUNTY		
400737088132301	Champaign #46	Private	L,Q,M,B
400832088190601	Champaign #54	Private	L,Q,M,B
401217088220301	Sangamon Valley PWD #1	Private	L,Q,M,B
401841088094701	Rantoul #7	Municipal	Q,M,B
	CHRISTIAN COUNTY		
393823089075901	Assumption #11	Municipal	L,Q,M,B
	COOK COUNTY		
413043087391201	Chicago Heights #30	Municipal	L,Q,M,B
413753087511701	Orland Park #2	Municipal	L,Q,M,B
413840087494001	Orland Park #11	Municipal	L,Q,M,B
414208087544501	DH-1	USGS	L,Q,M
414222087543601	DH-2	USGS	L,Q,M
414227087543701	DH-3	USGS	L,Q,M
414230087544201	DH-4	USGS	L,Q,M
414232087544101	DH-7	USGS	L,Q,M
414235087543901	DH-5	USGS	L,Q,M
414235087544001	DH-8	USGS	L,Q,M
414237087543901	DH-6	USGS	L,Q,M
414238087544001	DH-9	USGS	L,Q,M
414239087544101	DH-10	USGS	L,Q,M
414614087534901	Indian Head Park #2	Municipal	L,Q,M,B
415930088110601	Bartlett #1	Municipal	Q,M,B
420332088055701	Schaumburg #213	Municipal	L,Q,M,B
420432088114101	Hoffman Estates #22	Municipal	L,Q,M,B
420754087552001	Wheeling #4	Municipal	L,Q,M,B
	DE KALB COUNTY		
414603088521601	Shabbona #4	Municipal	L,Q,M,B
415424088462501	De Kalb #12	Municipal	L,Q,M,B

Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	DE WITT COUNTY		
400647088481101	Weldon #5	Municipal	L,Q,M,B
	DU PAGE COUNTY		
414217087592801	9	ANL	L,B
414236087583301	10	ANL	L,B
414633088080501	Naperville #5	Municipal	L,Q,M,B
414952087592601	Oak Brook Utility #6	Municipal	L,Q,M,B
415149088061701	Wheaton #2	Municipal	L,Q,M,B
415502088004701	Addison #8	Municipal	L,Q,M,B
415614088095701	Carol Stream #5	Municipal	Q,M,B
415807088003801	Itasca #5	Municipal	L,Q,M,B
	FORD COUNTY		
402719088084501	Paxton #7	Municipal	L,Q,M,B
	GALLATIN COUNTY		
374207088094201	New Shawneetown #4	Municipal	L,Q,M,B
374325088134701	Saline Valley WCD #1	Municipal	L,Q,M,B
	GRUNDY COUNTY		
412129088252701	Morris #4	Municipal	L,Q,M,B
	HENDERSON COUNTY		
405512090573601	Galesburg #74-3	Municipal	L,Q,M,B
	HENRY COUNTY		
412832090082901	Geneseo #25	Municipal	L,Q,M,B
	IROQUOIS COUNTY		
404629087453801	Watseka #7	Municipal	L,Q,M,B
405611087560001	Clifton #1	Municipal	L,Q,M,B
405712087392301	Beaverville #1	Municipal	L,Q,M,B
410010087550801	Chebanse #3	Municipal	L,Q,M,B

Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	KANE COUNTY		
414529088254301	Sugar Grove #2	Municipal	L,Q,M,B
415257088202001	Geneva #6	Municipal	L,Q,M,B
415635088182201	St. Charles #9	Municipal	L,Q,M,B
420555088165501	West Dundee #2	Municipal	L,Q,M,B
420720088154601	Carpentersville #6	Municipal	L,Q,M,B
	KANKAKEE COUNTY		
410127087425201	St. Anne #3	Municipal	L,Q,M,B
410325088022301	Herscher #8	Municipal	L,Q,M,B
410919087393201	Momence #3	Municipal	L,Q,M,B
411010087400901	Momence #4	Municipal	Q,M,B
	LAKE COUNTY		
420918087565401	Buffalo Grove #6	Municipal	Q,M,B
420949088082601	Barrington #4	Municipal	L,Q,M,B
421537088082101	Wauconda #2	Municipal	L,Q,M,B
421634088003301	Mundelein #3	Municipal	L,Q,M,B
421652088003601	Mundelein #5	Municipal	L,Q,M,B
422217087545201	Gurnee #1	Municipal	L,Q,M,B
422219088040601	Round Lake Beach #4	Municipal	L,Q,M,B
422356088105201	Fox Lake #2	Municipal	L,Q,M,B
422830088052501	Antioch #3	Municipal	L,Q,M,B
422901087492901	Winthrop Harbor #4	Municipal	L,Q,M,B
	LA SALLE COUNTY		
412120088500401	Ottawa #8	Municipal	L,Q,M,B
413255089064801	Mendota #3	Municipal	L,Q,M,B
	LIVINGTSON COUNTY		
404415088305101	Fairbury #4	Municipal	L,Q,M,B
	McHENRY COUNTY		
421034088164601	Algonquin #1	Municipal	L,Q,M,B
421333088204601	Crystal Lake #6	Municipal	L,Q,M,B
421955088263301	Woodstock #6	Municipal	L,Q,M,B
422455088370901	Harvard #5	Municipal	L,Q,M,B
422525088361401	Harvard #6	Municipal	L,Q,M,B

Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	MADISON COUNTY		
383929090012701	Collinsville #10	Municipal	L,Q,M,B
384740090022701	Edwardsville #8	Municipal	L,Q,M,B
384822090034801	Roxana #10	Municipal	L,Q,M,B
384955090055801	Hartford #4	Municipal	L,Q,M,B
385117090063701	Wood River #6	Municipal	L,Q,M,B
385205090044701	Bethalto #12	Municipal	L,Q,M,B
	MASON COUNTY		
401215089414501	Mason City #4	Municipal	L,Q,M,B
401351089503901	Easton #2	Municipal	L,Q,M,B
401754090032001	Havana #5	Municipal	L,Q,M,B
401811089361801	San Jose #4	Municipal	L,Q,M,B
402530089464201	Manito #3	Municipal	L,Q,M,B
	MASSAC COUNTY		
370724088374201	Brookport #3	Municipal	Q,M,B
371951088431101	Millstone PWD #1	Municipal	L,Q,M,B
	McLEAN COUNTY		
402912089090901	Normal #100	Municipal	L,Q,M,B
	MONROE COUNTY		
381749090185301	Valmeyer #4	Municipal	L,Q,M,B
	MORGAN COUNTY		
394957090331501	Meredosia #4	Municipal	L,Q,M,B
	PEORIA COUNTY		
404009089371401	Peoria Dodge St. #1	Private	L,Q,M,B
404528089335801	Peoria Heights #11	Municipal	L,Q,M,B
405536089300401	Chillicothe #7	Municipal	L,Q,M,B
	PIATT COUNTY		
400138088341601	Monticello #5	Municipal	L,Q,M,B

Table 3.--Ground-Water Stations--Continued

Station No.	Local Well No.	Ownership	Type of data
	PULASKI COUNTY		
371250089133401	Pulaski #1A	Municipal	Q,M,B
371637089105401	Ullin #1	Municipal	L,Q,M,B
	SCOTT COUNTY		
394600090360501	Jacksonville #2	Municipal	L,Q,M,B
	STEPHENSON COUNTY		
421826089374301	Freeport #7	Municipal	L,Q,M,B
	TAZEWELL COUNTY		
402024089184501	Armington #2	Municipal	L,Q,M,B
403626089282001	Morton #5	Municipal	L,Q,M,B
404222089243201	Washington #7	Municipal	L,Q,M,B
	UNION COUNTY		
372540089213401	Anna-Jonesboro #3	Municipal	L,Q,M,B
	WHITE COUNTY		
380530088035301	Carmi #4	Municipal	L,Q,M,B
	WHITESIDE COUNTY		
414617090141501	Albany #2	Municipal	L,Q,M,B
414540089415701	Rock Falls #4	Municipal	L,Q,M,B
	WILL COUNTY		
412518087590901	Manhattan #2	Municipal	L,Q,M,B
412905087514301	Frankfort #3	Municipal	L,Q,M,B
413238088084601	Joliet #11	Municipal	L,Q,M,B
413323087594501	Joliet #205	Municipal	Q,M,B
413514088011901	Lockport #5	Municipal	L,Q,M,B
	WINNEBAGO COUNTY		
421114089053901	Rockford Unit #28	Municipal	L,Q,M,B
421535089050301	Rockford Unit #11	Municipal	L,Q,M,B
422929089020901	S. Beloit #3	Municipal	L,Q,M,B

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